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MicroVAX 3100, VAXserver 3100, InfoServer 100 and InfoServer 150/150 VXT Maintenance Guide

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This manual describes how to troubleshoot, adjust, and repair MicroVAX 3100, VAXserver 3100, and InfoServer 100 systems to Field Replaceable Unit level.

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About This Manual

This guide describes how to troubleshoot, adjust, and repair the MicroVAX 3100 and the VAXserver 3100 Model 10 and Model 20, and the InfoServer 100 to Field Replaceable Unit (FRU) level. It covers all FRU options presently available for these systems. The nameplate on the front of the system box indicates the type of system you are working on. The model number is on the back of the system box.

Organization

This guide has eight chapters and eight appendixes.

- Chapter 1 contains testing procedures: power-up test, self-test, and system exerciser tests.
- Chapter 2 contains troubleshooting procedures to help isolate the problem to an FRU.
- Chapter 3 contains a description of the utilities.
- Chapter 4 describes the Model 10 system: a system overview, FRU removal and replacement, and description of options.
- Chapter 5 describes the Model 20 system: a system overview, FRU removal and replacement, and description of options.
- Chapter 6 describes the expansion boxes available for use with the system: an enclosure overview, troubleshooting information, and FRU removal and replacement procedures.
- Chapter 7 contains operating information: booting and removable media drives operating information.
- Chapter 8 describes the InfoServer 100 system: a system overview and FRU removal and replacement procedures.
- Appendix A lists the test commands.
- Appendix B lists the console commands and definitions.
- Appendix C lists the console messages and definitions.
- Appendix D lists the VMB boot error status codes and VMB definitions.
- Appendix E lists the power-up and self-test error codes.

- Appendix F lists the system exerciser error codes.
- Appendix G lists the definitions of the LEDs on the back of the system box.
- Appendix H gives the recommended spares list (RSL).

Intended Audience

This document is for DIGITAL Field Service personnel and self-maintenance customers only.

Conventions

This document uses the following conventions:

Convention	Meaning
CAUTION	Cautions provide information to prevent damage to equipment or software. Read these carefully.
NOTE	Indicates important information you should be aware of.
PN	Indicates a part number.
Return	Boxed text within examples and system displays identifies a key that should be pressed on the keyboard.
>>>	Indicates a console prompt.
Bold	Bold print identifies user input when used in examples and system displays.
⟨x:y⟩	Represents a bit field, a set of lines, or signals, ranging from x through y. For example, R0 ⟨7:4⟩ indicates bits 7 through 4 in general purpose register R0.
SHOW QUEUE	Command names in text are shown in uppercase.
CTRL/C	For sequences that use the CTRL key, hold down CTRL and press the second key.
`PV_SCS_FMTing...`	System displays used as examples are shown in monospace type .

1 Testing

This chapter describes how to test the MicroVAX 3100, the VAXserver 3100, and the InfoServer 100 systems. Testing procedures for these systems are similar and any differences between them are specifically identified in the text. The nameplate on the front of the system box indicates the type of system you are working on.

All testing is done while in console mode and diagnostic tests are ROM-based.

This chapter contains the following sections:

- Using console mode
- Running power-up tests
- Running self-tests
- Running system exerciser diagnostics

1.1 Using Console Mode

The system has two modes of operation: program mode and console mode. Program mode is when the operating system (for example, VMS or ULTRIX) is controlling the system. Console mode allows the user to control the system from the console terminal. Console mode is contained in ROM on the system module.

See Appendix B for a description of the console commands.

Testing is done while in console mode. The system returns the console prompt (>>>) when it is in console mode. Table 1–1 lists the prompts and the mode of operation each prompt represents.

Table 1–1 Prompts

Prompt	Mode of operation
(>>>)	Console mode. See Appendix B for a list of console commands.
$	Program mode (VMS operating system).
%	Program mode (ULTRIX operating system).
#	Program mode (ULTRIX operating system, privileged mode).

1.1.1 Determining the Console Device

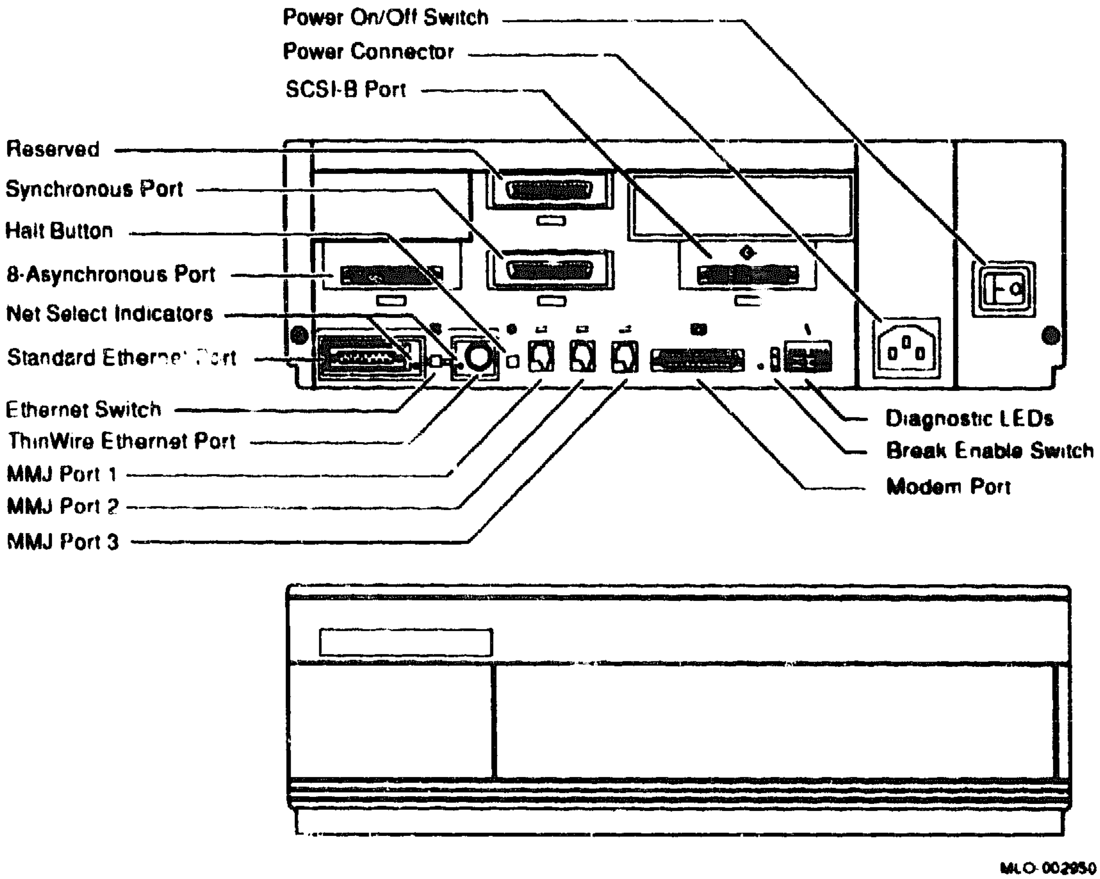
The console device, a VTxxx terminal, is connected to MMJ port 1. Figure 1–1 shows the ports and connectors at the rear of the Model 20 system. The Model 10 system is identical except for the port marked reserved. Figure 4-1 shows the front and rear panels of the the Model 10 system.

A terminal (VTxxx series) can be connected to MMJ Port 3 and made to operate as the console terminal by setting BREAK ENABLE correctly. The switch on the back of the system box must be in the up position at power-on if the terminal connected to MMJ Port 3 is to be recognized as the console. Otherwise, the console is the terminal connected to MMJ Port 1.

The terminal must be set at 9600 baud, with 8 bits, and no parity.

A terminal attached to MMJ Port 3 with BREAK ENABLED allows you to halt the CPU and go directly to console mode by pressing the BREAK key on the keyboard.

Figure 1–1 Ports and Connectors



1.1.2 Entering Console Mode

Console mode is entered any time the CPU halts. A halt means that control has passed from the operating system software to the console mode program in ROM. The CPU can be halted automatically or manually. When halted automatically (boot failure, major system error, or after power-up testing), the console mode program checks the nonvolatile RAM for user-defined instructions (restart, boot, or halt). The system then executes the instructions. The CPU is halted manually by pressing the Halt button on the back of the system box and the system enters console mode immediately. Figure 1–1 shows the position of the Halt button.

Have the system manager shut down the operating system software, then press the halt button to enter console mode.

NOTE

Press the BREAK key on the keyboard to enter console mode if you are using a terminal attached to MMJ Port 3 with BREAK ENABLED.

1.1.3 Exiting Console Mode

To exit console mode, type one of the following console commands (See Appendix B):

- BOOT—This command initializes the CPU and boots the operating system software from the device specified. If no device is specified, the system uses the default device in NVR. If no device is listed in NVR, the system defaults to the Ethernet (ESA0) as the boot device.

  The BOOT command starts the system but does not run power-up tests. If the system attempts to boot over the Ethernet (ESA0) and no response is received, make sure the node with the operating system software is operating normally and the software is loaded. Press the halt button if you need to abort the Ethernet boot.

- CONTINUE—This command instructs the CPU to continue the operating system software at the address contained in the program counter (PC). This command starts up the operating software where it was halted provided no console TEST commands were run. Running a TEST command alters the PC register and memory so that the operating system software cannot be started correctly by entering the CONTINUE command. Enter the BOOT command to start the operating system software if a TEST command was entered.

- START—This command starts the operating system software at a specified address. If no address is given, the contents of the PC register are used. However, running a TEST command alters the PC register and memory so that the operating system software cannot be started correctly by entering the START command. If a TEST command was entered, use the BOOT command to start the operating system software.

1.2 Running Power-Up Tests

Power-up tests run each time the system power is turned on and, if the tests are successful, the system either boots the operating system or halts in console mode when the tests have finished, depending on the default recovery action. See Chapter 3, Setting the NVR Default Recovery Action Flags.

Power-up testing consists of a sequence of tests executed for each device installed in the system. The test number of each device is listed on the power-up screen display as the device is tested. LEDs on the rear of the system box indicate the status of the system as it is powered up. See Appendix G for a definition of the LEDs, if you need them.

Figure 1–2 shows an example of the power-up display and the power-up summary.

Figure 1–2 Example of Power-Up Test and Power-Up Summary

```
KA41-A V1.4 ❶

F_..E...D...C...B...A...9...8...7...6...5...4...3...2_ .1?.. ❷

 ? E    0040  0000.0005     (Soft error) ❸
?? 1    00C0  0100.2004     (Hard error) ❸
```

❶ CPU name and ROM version

> **NOTE**
> **The -A in the CPU name indicates that the system under test is a MicroVAX 3100 system. The CPU name of the VAXserver 3100 is KA41-B or KA41-E; for the InfoServer 100, the CPU name is KA41-1.**

❷ Power-up test sequence

❸ Power-up summary

1.2.1 CPU Name and ROM Version

The first line, ❶ in Figure 1–2, indicates the CPU name (KA41-A) and the ROM version (V1.3 or higher).

1.2.2 Power-Up Test Sequence

In the power-up test sequence, ● in Figure 1–2, the test numbers (in hexadecimal) are listed in descending order from the first test, F, to the final test, 1. Each test number is followed by three periods (...) or a symbol and two periods (?.. for example). Table 1–2 outlines the significance of each symbol.

Table 1–2 Power-Up Symbols Defined

Symbol	Definition
...	Device tested successfully or it may have a soft error.
?..	Device has a hard error.
_..	Option device not installed or device not tested.
*..	Option device installed, but its ROM code has not been executed.

The underscores in line ● indicate that no option device is installed; therefore, no option tests are done.

An asterisk (*) may only appear in TESTS 7, 6, or 4 through 2 and indicates that an optional device is installed, but its ROM is destroyed and the optional device must be replaced. Only TESTS 7, 6, or 4 through 2 can have an * after them.

In the power-up test sequence, hard errors (errors that indicate the device must be replaced for proper operation) are indicated by a question mark (?). Note that soft errors do not put a question mark after the failing test number during the countdown sequence.

1.2.3 Power-Up Summary

The power-up summary, ● in Figure 1–2, lists any errors found during the power-up test. Figure 1–2 shows the power-up screen display with a hard error found in TEST 1 and a soft error found in TEST E.

The power-up summary consists of question mark or two question marks (??), a test number, the ID number of the failed device, and an 8-digit code. In the power-up summary, two question marks indicate a hard error and one question mark indicates a soft error or a status for that device.

For example, in the power-up summary, ❺, the first line shows a soft error for TEST E, a device ID number of 0040, and a code of 0000.0005. The second line shows a hard error for TEST 1, a device ID of 00C0, and a code of 0100.2004. The device tested by TEST 1 must be replaced, but the device tested by TEST E only indicates a status code and does not have to be replaced. When you are not sure whether a device needs replacing or not, refer to the troubleshooting section for that device (See Chapter 2).

Usually, a question mark in the power-up summary indicates a minor problem and the system may be usable without replacing any FRUs. Two question marks in the power-up summary indicates a hard error. This indicates a serious problem that may affect normal operation and use of some component in the system. The failing device must be replaced before booting the operating system software. If your system boots automatically, you must stop the booting process by pressing the Halt button and check the status of all devices in the system.

1.2.4 Checking the System Devices

Enter TEST 50 to display the configuration table after the power-up tests. Check all the devices in the system to make sure they are all listed (on-line). If, for instance, a disk drive is installed but its power connector becomes unplugged, the tests would not show an error during testing. You should be familiar with the good status codes for each device listed in the configuration table and know when a drive's status code shows it to be off-line when it really should be on-line.

If the terminal screen remains blank for more than 5 minutes after the power is switched on, there may be a problem with the terminal, the terminal cable, or the system. Check the LEDs on the back of the system box to determine if the system has failed. If the system is normal, check the terminal and cable. See Appendix G for a definition of the LEDs, if you need them.

1.2.5 Power-Up Test Codes

The power-up test codes indicate hard (fatal) errors, soft errors, no errors, or status information. Any errors found by power-up tests are listed in the power-up tests summary. These errors as well as the status of all devices installed in the system are then stored in the configuration table. Enter TEST 50 to display the configuration table.

Table 1–3 lists the test numbers and the devices that are tested during that particular test. Enter TEST 50 (T 50) to display the configuration table. The configuration table allows you to look at the status of a device. It lists every device in the system and also lists the results of the power-up tests and self-test. It is updated each time a self-test is run. Remember that the configuration table contains the results of the power-up tests and self-test and not the results of the system exerciser. See Section 1.3, Running Self-Test and Section 1.4, Running System Exerciser Diagnostics.

Table 1–3 Power-Up and Self-Test Commands

Test	Mnemonics	Device
T F	--	Reserved
T E	CLK	Time-of-year clock
T D	NVR	Nonvolatile random access memory (RAM)
T C	DZ	Serial line controller
T B	MEM	Memory
T A	MM	Memory management unit
T 9	FP	Floating point unit
T 8	IT	Interval timer
T 7	SCSI-A	SCSI-A bus devices
T 6	SCSI-B	SCSI-B bus devices
T 5	SYS	Interrupt controller and Ethernet ID ROM
T 4	DSH32-A	DSH32-B communications module asynchronous lines
T 3	DSH32-S	DSH32-B communications module synchronous lines
T 2	--	Reserved
T 1	NI	Ethernet circuits

Figure 1–3 shows an example of a configuration table.

Figure 1–3 Configuration Table (T 50)

```
>>> TEST 50
 KA41-A V1.3
 ID 08-00-2B-03-79-1F
  CLK         0000.0001
  NVR         0000.0001
  DZ          0000.4001
     00004001 00000001 00000001 00000001 00000000 00000000
  MEM         0004.0001
     00400000
  MM          0000.0001
  FP          0000.0001
  IT          0000.0001
  SCSI-A      7711.0001 V1.0
     FFFFFF05 FFFFFF05 FFFFFF05 00000001 FFFFFF05 FFFFFF03 FFFFFF
  SCSI-B      1C1C.0001 V1.0
     FFFFFF05 FFFFFF05  . . .  00000001  . . .  FFFFFF03 FFFFFF05
  SYS         0000.0000
  DSH32-A     00FF.0000 V2.0
  DSH32-S     0000.0001 V2.0
  NI          0000.0001
>>>
```

Any code in the configuration table other than 0000.0001 on the MM, FP, IT, or SYS devices indicates a hard error and the system module must be replaced for proper operation of the system. The other devices such as CLK, NVR, DZ, MEM, SCSI-A, SCSI-B, and NI may have a code other than (0000.0001) and may still operate normally.

Any code in the configuration table other than 0000.0001 on the DSH32-S device indicates a hard error and the DSH32-B communications module or the distribution board must be replaced for proper operation of the system. The DSH32-A device may have a code other than (0000.0001) and may still operate normally.

Go to the device's troubleshooting section to determine whether or not the device's code indicates a fault or a status for the device. See Chapter 2.

See Chapter 3 for more information on reading the configuration table. See Appendix E for a complete list of the power-up error codes.

Since a question mark could indicate status information, some common power-up status messages are defined as follows:

- Clock not set — ? E 0040 0000.0005

  This message indicates that the system clock has not been set. The clock cannot be set while in console mode; it is set in program mode. Once the clock is set, this code will be cleared the next time the clock circuits are tested.

- Low battery — ? D 0050 0000.0005

  This message indicates that the battery's charge is low which may be the case when a system is first installed. Run the system for about 17 hours to fully recharge the battery.

- No Ethernet cable (ThinWire) — ?? 1 00C0 0000.7004

  This message indicates that the ThinWire Ethernet connector on the back of the system is not terminated or that the ThinWire Ethernet cable is not terminated correctly.

- No Ethernet cable (standard) — ?? 1 00C0 0011.700E

  This message indicates that the standard Ethernet connector on the back of the system is not terminated or that the standard Ethernet cable is not terminated correctly.

- No heartbeat on standard Ethernet — ?? 1 00C0 0100.0001

  This message indicates that the standard Ethernet is selected and terminated correctly, but the Ethernet network is not supplying the necessary heartbeat signals to the system. This is normal if the loopback connector is installed on the standard Ethernet connector.

1.3 Running Self-Test

Self-test allows you to test every device again after the power-up tests are completed. Devices can be tested individually (except for drives), a few at a time, or all of them sequentially just like power-up tests.

1.3.1 Self-Test Diagnostic Commands

Enter TEST or just T, followed by a space and the test number of the device you want tested to individually test a device (drives are tested all together on their particular bus). All devices connected to the SCSI bus are tested and the results are listed in the configuration table. Enter TEST 50 to view the configuration table.

Table 1–3 lists each device and its corresponding test number. Figure 1–4 shows an example of running self-test on an SCSI bus.

Figure 1–4 Example of Running Self-Test on an SCSI Bus

```
>>> TEST 6
  6...
>>>
```

NOTE

Enter TEST 50 to see the results.

Enter TEST followed by the test number of the first device to be tested and then the test number of the last device to be tested to test a group of devices. For example, enter TEST C 4 to test all devices between C and 4. You cannot exclude any intermediate tests, every device between C and 4 is tested. Enter TEST F 1 to test all devices. Enter REPEAT TEST x, where x is any device between F and 1, to run a test repeatedly without reentering it. Enter CTRL/C to exit from this test.

1.3.2 Self-Test with Loopback Connectors

Customer mode self-test does not test the drivers on the serial lines (DZ) because serial line loopbacks are not installed. The Serial Line Controller (DZ) must be tested in Field Service mode. Enter TEST C with loopbacks installed in the two unused MMJ connectors and a 25-pin loopback installed in the modem port. Enter TEST 50 to check the results in the configuration table.

If only one MMJ loopback is available, install it in one of the ports and run the tests. An error code of 0000.0200 for the DZ indicates that some ports do not have the loopback installed, but the test port tested successfully. The diagnostic test recognizes that a terminal is connected to MMJ port 1 and no hard errors are generated for that port.

Similarly, Customer mode self-test does not test the the external cabling or the transmit drivers or receivers on the distribution board. The transmit drivers, receivers, and the external cabling must be tested in Field Service mode.

To test the DSH32-B communications module, the distribution board, and the internal cabling, proceed as follows:

1. Install the H3101 36-pin loopback in the asynchronous port on the rear of the system unit (see Figure 1–1).
2. Install the H3199 50-pin loopback in the synchronous port on the rear of the system unit (see Figure 1–1).
3. Enter TEST 3 to run self-test on the DSH32-S subsystem.
4. Enter TEST 4 to run self-test on the DSH32-A subsystem.

If you wish to include the external cables in the tests, proceed as follows:

1. Connect the 50-pin connector of the synchronous cable to the synchronous on the rear of the system unit (see Figure 1–1).
2. Connect the 25-pin loopback (H3248 for RS232) or the 37-pin loopback (H3198 for RS422/RS423) to the other end of the synchronous cable.
3. Connect one end of the asynchronous cable to the asynchronous port on the rear of the system unit (see Figure 1–1).
4. Connect the 36-pin loopback to the other end of the asynchronous cable.
5. Enter TEST 3 to run self-test on both the DSH32-S subsystem and synchronous cable.
6. Enter TEST 4 to run self-test on both the DSH32-A subsystem and asynchronous cable.

To test the cable concentrator (H3104), remove the 36-pin terminator from the 36-pin cable and connect the cable to the concentrator. Install one or more MMJ loopbacks in the ports on the cable concentrator. Enter TEST 4 at the console prompt. Table 1–4 shows additional self-test commands that provide further testing capability.

Table 1–4 Self-Test Commands

Command	Meaning
>>>T 4000000X[1]	Run self-test once in customer mode, loop on error (LOE).
>>>T 8000000X[1]	Run self-test in customer mode, loop on test (LOT).
	This command can be negated by typing CTRL/C.
>>>T C000000X[1]	Run self-test, loop on error (LOE), loop on test (LOT), in customer mode.

[1]X=3 For synchronous subsystem (DSH32-S) or X=4 for asynchronous subsystem (DSH32-A)

NOTE

The ThinWire Ethernet port or the standard Ethernet port (depending on which port the customer is using) on the back of the system box must be terminated correctly when running diagnostics on the Ethernet circuits (TEST 1). Otherwise an error code of 0000.7001 or greater is listed in the configuration table.

1.3.3 Self-Test Codes

If an error is detected during self-test, a question mark is put next to the test number and a failure message (84 FAIL) is displayed. Enter TEST 50 to check the results in the configuration table after self-test is completed. The configuration table lists every device in the system, the results of the self-test and power-up tests, and displays the error codes. It is updated each time self-test is run. Remember that the configuration table contains the results of the self-test and power-up tests and not the results of the system exerciser. See Section 1.4. Go to the device's troubleshooting section to determine whether or not the device's code indicates a fault or a status for the device. See Chapter 2.

See Chapter 3 for more information on reading the configuration table. See Appendix E for a complete list of the self-test error codes.

1.4 Running System Exerciser Diagnostics

The system exerciser simulates a worst-case operating system situation test for each device and checks how the device operates under these conditions. This type of testing usually finds any interactive problems.

There are three modes of system exerciser; customer mode, manufacturing mode and Field Service mode. Table 1–5 lists the test numbers corresponding to each mode.

Table 1–5 System Exerciser Test Modes

Test No.	System Exerciser Mode
T 0	Customer mode
T 101	Field Service mode
T 102	Field Service mode
T 80000103	Manufacturing mode
T 80000106	Field Service mode

CAUTION

TEST 80000103 and TEST 80000106 overwrite customer data.

Table 1–6 describes these commands in detail.

The system exerciser exercises most of the devices. However, some devices such as the memory management unit (MM) and the interval timer (IT) are tested through the testing of other devices and are not displayed. Of the devices the exerciser does exercise, it runs each one sequentially until all have been run once, then it runs them concurrently.

To run the Field Service mode system exerciser, we recommend that the console terminal be attached to MMJ Port 3 with BREAK ENABLED; however, MMJ Port 1 can also be used. Install loopback connectors on any unused MMJ ports, the modem port, and on the synchronous and asynchronous ports of the DSH32-B communications module. Insert and load the special-keyed[1] test diskette, compact disc, and tape cartridge (if the system has these devices installed).

[1] This special key on the media prevents the exerciser from accidentally destroying data on the customer's diskette or tape cartridge. The compact disc is a read-only device.

Enter TEST 101, TEST 102, or TEST 80000106 to run the exerciser in Field Service mode.

NOTE

A 12-15336-08 Modem Port Loopback Connector must be used to enable operation of the service exerciser tests.

TEST 80000106 allows you to enter the test number of the individual devices you want to run the exerciser on. Figure 1–5 shows an example of running the system exerciser on the the DSH32-A subsystem.

Figure 1–5 Running the System Exerciser on Individual Devices

```
>>> TEST 80000106
?>>> 4 3
```

NOTE

Entering 4 3 at the ?>>> prompt tests both the DSH32-A and DSH32-S subsystems of the DSH32 option. Entering 3 will test only the DSH32-S subsystem. Entering 4 will test only the DSH32-A subsystem.

This procedure tests only as far as the loopbacks on the asynchronous port. To test the external cable, remove the H3101 36-pin loopback connector from the asynchronous port and connect it to one end of the 36-pin cable. Connect the other end of the 36-pin cable to the asynchronous port on the rear of the system unit. Enter TEST 4 at the console prompt >>>.

To test the cable concentrator, remove the H3101 36-pin loopback from the asynchronous port. Connect one end of the 36-pin cable to the asynchronous port. Connect the other end of the 36-pin cable to the cable concentrator. Install one or more MMJ loopbacks in the cable concentrator. Enter TEST 4 at the console prompt >>>.

If the diskette or tape drive are not loaded with the special-keyed media, the system exerciser does not do destructive writes to them and tests them the same way as it does during the customer mode system exerciser. If the compact disc drive is not loaded with the test disc (P/N 30-23507-03), the drive does not perform any reads. If the test disc is not available, any disc loaded allows the exerciser to perform reads but does not check the error correction circuits (ECC). See Section 3.6 if you need information on creating the special diagnostic keys on diskette. See Section 3.5 if you need information on creating the special diagnostic keys on tape.

The test numbers and mnemonics used for the system exerciser are the same as the test numbers and mnemonics used by self-test. See Table 1–3.

1.4.1 System Exerciser Diagnostic Commands

Table 1–6 describes the system exerciser commands.

When running TEST 0 or TEST 101, the exerciser automatically stops after all the devices have been tested simultaneously. Typically, it takes about 5 minutes for the test on the slowest device to finish. When the test is finished, the results and the halt message (06 HLT INST) are displayed. This halt message is normal for these two tests.

If TEST 102 or TEST 80000106 is entered, the exerciser continues testing until you press CTRL/C.

Table 1–6 System Exerciser Diagnostic Commands

Test	Description of Commands
T 0	Runs customer mode system exerciser. No loopback connectors and no removable media are required. It exercises each device once sequentially, then exercises them simultaneously, and stops when the slowest device finishes (about 5 minutes).
T 101	Runs Field Service mode system exerciser. Loopbacks and removable media are required. It exercises each device once sequentially, then exercises them simultaneously, and stops when the slowest device finishes (about 5 to 8 minutes). Do not stop the exerciser before it is finished.

Table 1–6 (Cont.) System Exerciser Diagnostic Commands

Test	Description of Commands
T 102	Runs Field Service mode system exerciser. Loopbacks and removable media are required. It exercises each device once sequentially and then exercises them simultaneously until you terminate the tests. Press CTRL/C to terminate the tests. Once the test are terminated, an extended summary for some of the tests can be displayed. Press RETURN to display the extended summary. Continue pressing RETURN to display more extended summaries. Press CTRL/C again to terminate the extended summary and return control to the console prompt (>>>). Note that the exerciser takes up to 30 seconds to stop after you press CTRL/C. Do not stop the exerciser until every device is exercised twice (second pass). Also, do not press the halt button to stop the exerciser.
T 80000106	Individual device testing. Loopbacks and removable media are required. Runs system exerciser diagnostics on individual devices (TEST 6 and TEST 7 are considered individual devices even though they test several drives). This test allows you to test individual devices by entering the test number of the device at a second prompt. This individual testing saves time since you do not have to wait for all of the other devices to finish testing.
T 80000103	Runs manufacturing mode system exerciser. Loopbacks and removable media are required. It exercises each device once sequentially and then exercises them simultaneously until you terminate the tests. Press CTRL/C to terminate the tests. Once the test are terminated, an extended summary for some of the tests can be displayed. Press RETURN to display the extended summary. Continue pressing RETURN to display more extended summaries. Press CTRL/C again to terminate the extended summary and return control to the console prompt (>>>). Note that the exerciser takes up to 30 seconds to stop after you press CTRL/C. Do not stop the exerciser until every device is exercised twice (second pass). Also, do not press the halt button to stop the exerciser.

1.4.2 System Exerciser Codes

The system exerciser displays the status of the devices on the screen as the exerciser is running. Any errors found are displayed in the exerciser display. When examining the exerciser display, one question mark in the far left column indicates a soft error, two question marks indicate a hard error, and the absence of question marks usually indicates success. There may be times when there are no question marks, but a drive may not be

listed in the display (for example, an unplugged power cable.. In these instances, you need to be familiar with the codes of all devices so that when you examine the display, you know if a specific drive or device is listed and if the drive or device has a fault.

Figure 1–6 shows an example of the system exerciser display while running the system exerciser in Field Service mode. Customer mode gives the same display, but with a CU (customer mode) in place of the FS (Field Service mode) on the top of the display.

Figure 1–6 System Exerciser Display Example

```
>>> TEST 101

KA41-A  V1.3          01      FS

   C  0080   D7       0000.0001  14            0 00:01:12
   B  0010   'FM      0137.0001   5 00A7       0 00:02:02
   7  0090   SCSI-A   6000.0001  22 0002       0 00:02:23
                      3200.0001
   6  00A0   SCSI-B   6000.0001  15 0002       0 00:02:56
                      2200.0001
                      3200.0001
                      4101.0471
                      7200.0001
   4  81F0   DSH32-A  00FF.0001   2            0 00:03:15
        0001.0001
        0001.0001
        0001.0001
        0001.0001
   3  81F1   DSH32-S  0001.0000   2            0 00:03:26
                      0000.0001
   1  00C0   NI       0000.0001   9             0 00:04:01

 00    0.00:08:14
?06    HLT INST
       PC - 00005A0F
```

- The CPU name (KA41-A), the ROM version (V1.3), the ROM status (01 — if not 01, the ROM is corrupted and the system module must be replaced), and the mode of the system exerciser (CU for customer and FS for Field Service mode). The following lines of the display list information on the devices that are exercised by the system exerciser.
- Example of RRD40 error code.
- Status indicators (if any).
- The test number (C,B,7,6,1). TESTS 7, 6, and 4 through 2 are option modules and are listed in the display only if they are installed.
- The device identifier (0080, 0010, and so on).
- The mnemonic for each device (DZ, MEM, and so on).
- The code (0000.0000) for that device. Note that the SCSI-A and SCSI-B devices have additional codes for each drive that is installed.
- The number of times the device was tested.
- The progress count (available on some devices).
- The time of the last pass the exerciser made on that device. The time is in the following format; days hours:minutes:seconds.

A question mark in the far left column indicates a soft error, two question marks indicate a hard error, and the absence of question marks usually indicates success. If an error is indicated, go to the device's troubleshooting section to determine whether or not the device must be replaced for normal operation. See Chapter 2.

See Appendix F for a complete list of the system exerciser error codes.

Some devices display the progress count which indicates the progression of the test for that device. At the beginning of each test pass, the progress count is again initialized to zero.

1.4.3 Extended Summary Reporting

Extended summaries are available only when running the system exerciser in Field Service mode. They contain additional error information on some of the devices run by the exerciser. Extended summaries are available after the following tests:

- When running TEST 101, extended summaries are available when the testing automatically stops after the second pass.
- When running TEST 102, extended summaries are available when you halt the tests. Press CTRL/C to halt the test when the second pass is completed.
- When running TEST 80000106, extended summaries are not immediately available. Enter SHOW ESTAT at the console prompt (>>>) to display the results of the tests once again.

When running TEST 101, press RETURN after the test has stopped to display the first extended summary. Continue pressing RETURN to display all of the extended summaries, until you return to the exerciser display.

When running TEST 102, press CTRL/C to halt the system exerciser. Press RETURN to display the extended summaries. Continue pressing RETURN to display more extended summaries. Press CTRL/C return to the console prompt (>>>).

When running TEST 80000106, extended summaries are not available. Press the halt button after the second pass of the test has finished and enter the SHOW ESTAT command at the console prompt (>>>) to display the results of the test once again.

Figure 1–7 shows an example of the extended summary for the SCSI-A device and then an example for the SCSI-B device.

Figure 1–7 Example of SCSI Extended Summary Report

```
KA41-A   V1.3          01           FS

******** SCSI-A              STM_SUMM          0 00:05:57 ******

     adr        rds       wts       xfs       xferr       sde
     ---      -------   -------   -------    -------      ---

     003        008       000       157       000          1

********* STM_TYPE_ANYTHING

>>> [Return]

******** SCSI-B              STM_SUMM          0 00:05:57 ******

     adr        rds       wts       xfs       xferr       sde
     ---      -------   -------   -------    -------      ---

     004        008       000       073       000          1
     005        008       004       023       000          1
     ❶          ❷         ❸         ❹         ❺

********* STM_TYPE_ANYTHING
```

❶ The SCSI address ID of a drive.

❷ The number of reads performed on that drive.

❸ The number of writes performed on that drive.

❹ The number of data transfers performed on that drive.

❺ The number of transfer errors on that drive.

Enter SHOW ESTAT to display the extended summaries once again after exiting the system exerciser. SHOW ESTAT brings up extended summary information from the last time you ran the Field Service system exerciser.

2 Troubleshooting

This chapter contains information on troubleshooting a MicroVAX 3100, a VAXserver 3100, or an InfoServer 100 system. The nameplate on the front of the system box identifies the system type. All procedures in this chapter apply to these systems unless specifically listed in the section titles or as described in the text. Also, all troubleshooting procedures are done while in console mode (operating system software halted).

2.1 Troubleshooting Procedures

Refer to Table 2–1 to locate the troubleshooting section for the faulty device if you already know which device it is.

Run the diagnostics (self-test or system exerciser) if you think there is a problem with the system but are not sure which, if any, device is faulty. When you identify the faulty device, refer to Table 2–1 to locate the troubleshooting section for that device. See Chapter 1 for a description of the diagnostic procedures.

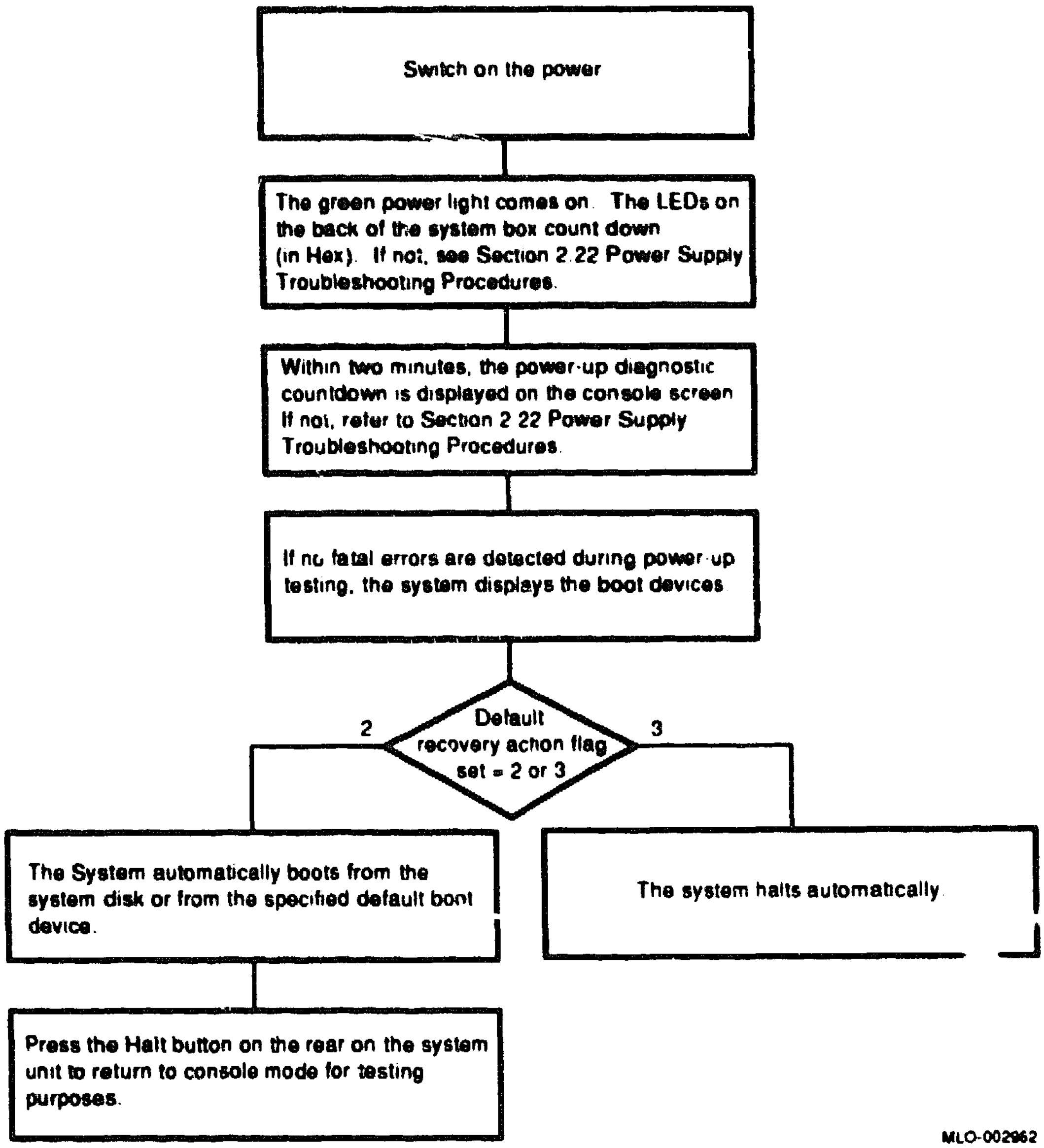
Table 2–1 Troubleshooting Procedures

Failing Test	Device	Section
E	CLK	2.3
D	NVR	2.4
C	DZ	2.5
B	MEM	2.6
A	MM	2.7
9	FP	2.8
8	IT	2.9
7	SCSI-A	2.10
6 or 7	RZ23 disk drive	2.14
6 or 7	RX23 diskette drive	2.15
7	TZ30 tape drive	2.13
6	SCSI-B	2.11
6	RZ55 expansion box	6.1.1
6	RRD40 expansion box	6.2.1
6	TK50Z expansion box	6.3.1
5	SYS	2.17
4	DSH32-B communications module asynchronous lines	2.18
3	DSH32-B communications module synchronous lines	2.19
1	NI	2.21
_	No screen display	2.2

2.2 No Screen Display

Figure 2–1 shows the normal sequence of events during power-up. Refer to Section 2.2.1, Troubleshooting Procedure for No Screen Display, if nothing is displayed on the console screen during power-up.

Figure 2–1 Normal System Power-Up Flowchart



2.2.1 Troubleshooting Procedure for No Screen Display

Each step in this troubleshooting procedure instructs you to disconnect an FRU, power-up the system, and determine if the problem still exists. Each step describes a different FRU to disconnect. You must disconnect an FRU as described in each step until the system powers-up normally. Once the system powers-up normally, the last FRU you disconnected is the failing FRU. Replace the failing FRU and retest the system for any further problems.

Follow these steps to locate the failing FRU:

1. Check the terminal cable for a good connection on the terminal and on the system box. Make sure the terminal is switched on. The LED on the terminal should be lit when power is supplied. Check the terminal set-up. It should be set to 9600 baud, 8 bits, and no parity (Check the terminal documentation if you do not know how to change the set-up). Turn up the brightness control until raster is observed. If no raster appears on the screen, refer to the terminal troubleshooting documentation.
2. Power down the system. Check the position of the Break Enable switch on the back of the system box. It should be in the down position if a terminal connected to MMJ port 1 is used as the console device. It should be in the up position if a terminal connected to MMJ port 3 is used as the console device. Confirm that the terminal has no output when connected to either port. See Figure 1-1.

   NOTE
   The position of the switch is only read during power up.
3. Power down the system, remove both drive mounting panels from the system unit, and disconnect and remove the DSH32-B communications module (if installed).
4. Remove the memory module from the system module.
5. Power up the system with the memory module disconnected. If the system has no screen display, the problem is not the memory module, proceed to step 6. If the system has a screen display, replace the memory module and retest the system.
6. Power down the system. Replace the system module and power up the system again. If the system still has no screen display after replacing the system module, replace the power supply.

2.2.2 Additional Information on Nonoperating Systems

See Appendix E for a complete list of the power-up and self-test error codes. See Appendix F for a complete list of the system exerciser error codes.

2.3 TEST E — CLK — Time-of-Year Clock

The time-of-year (TOY) clock controls the system date and time. The date and time cannot be set while the system is in console mode. Therefore, the code for the TOY clock should always indicate a soft error (0000.0005 - clock not set) when the system is first powered on after replacing a system module or the battery or before the operating system software is installed.

Self-test is used to troubleshoot the time-of-year clock circuits. The system exerciser does not test the TOY clock circuits. Enter TEST E to run self-test.

A code of 0000.0001 next to the CLK mnemonic indicates no errors detected with the clock circuits. Replace the system module if any other code is listed (except 0000.0005 as previously described).

2.3.1 Additional CLK Information

The operating system (VMS or ULTRIX) sets the date and time. Refer to the operating system documentation to set the time.

The TOY clock is located on the system module. Therefore, the system module must be replaced whenever the clock shows an error other than the clock not set error.

See Appendix E for a complete list of the power-up and self-test error codes.

2.4 TEST D — NVR — Nonvolatile RAM

The nonvolatile RAM (NVR) contains specific data that must not be lost when the system is powered down. It stores boot device information, boot flag information, the keyboard language, the time and date, the charge status of the battery, and other information. Since the battery charge may be low before the initial installation of the system, the NVR may show a soft error code of 0000.0005 indicating that the battery needs to be recharged.

Self-test is used to troubleshoot the NVR circuits. The system exerciser does not test the NVR circuits. Enter TEST D to run self-test.

A code of 0000.0001 next to the NVR mnemonic indicates no errors detected with the NVR circuits. Replace the system module if any other code is listed (except 0000.0005 as previously described).

2.4.1 Additional NVR Information

The NVR circuits are located on the system module. Therefore, any error code for the NVR, except the low battery charge code (0000.0005 - low battery) indicates that the system module must be replaced. If the low battery charge code does not clear within 1 hour of continuous operation, check the battery cable connection. Then replace the battery and allow it to charge for a 24-hour period.

See Appendix E for a complete list of the power-up and self-test error codes.

2.5 TEST C — DZ — Serial Line Controller

The serial line controller (DZ) controls the four serial lines on the system module. Table 2–2 lists the four serial lines and the port mnemonic for VMS and ULTRIX operating systems.

Run self-test and the system exerciser to troubleshoot the DZ circuits. Enter TEST C to run self-test. Then enter TEST 50 to see the results. Enter TEST 80000106 and press RETURN, then enter C in response to the ?>>> prompt to run the Field Service system exerciser on the serial line controller only. Figure 2–2 shows an example of this command.

Figure 2–2 Running the System Exerciser on the Serial Line Controller (DZ)

```
>>> TEST 80000106
?>>> C
```

A code of 0000.0001 next to the DZ mnemonic indicates no errors detected in the serial line controller circuits. Replace the system module if any other code is listed.

2.5.1 Additional DZ Information

Install a 12-15336-08, 25-pin D-sub loopback connector on the modem port and loopback connectors on MMJ ports 2 and 3 when running the tests in Field Service mode. The diagnostic test recognizes that a terminal is connected to MMJ port 1 and no hard errors are generated for that port.

If MMJ port 3 is used as the console port, by setting the Break Enable switch to the up position before the system is powered on, the terminal can be connected to MMJ port 3 and the loopback connectors installed on ports 1 and 2.

The loopback connectors are not needed during customer mode testing because the DZ uses internal loopback switches for transmission testing.

During Field Service mode testing, the serial line drivers are fully tested. Characters are sent out to the four serial lines. They are verified as they are looped back into the port's receiver. If a loopback connector is not installed or the wrong character is received, an error code is listed in the DZ code for that port.

The DZ circuits are on the system module. Therefore, if an error code for the DZ other than 0000.0001 is indicated, replace the system module. While in Field Service mode, check the loopbacks for proper installation before replacing the system module.

See Appendix E for a complete list of the power-up and self-test error codes. See Appendix F for a complete list of the system exerciser error codes.

In the configuration table (TEST 50), the DZ contains six additional status codes. See Figure 2–3. Any code other than the codes shown indicates a failure on that line.

Figure 2–3 Example of the DZ Line in the Configuration Table

```
DZ       0000.0001
00000001 00000001 00000001 00000001 00000000 00000000
```

- MMJ port 1 (DEC423)
- MMJ port 2 (DEC423)

- Modem (RS232 Serial line port)
- MMJ port 3 (DEC423)
- Unused
- Unused

Table 2–2 DZ Port Assignments

Port	VMS Mnemonic	ULTRIX Mnemonic
MMJ Port 1	TTA0	/dev/tty00
MMJ Port 2	TTA1	/dev/tty01
Modem	TTA2	/dev/tty02
MMJ Port 3	TTA3	/dev/tty03

2.6 TEST B — MEM — Memory

The memory diagnostics test all of the main memory in the system including any memory option modules installed. Therefore, any error for the memory must be deciphered to determine which module contains the error. There may be more than one module containing the error.

Self-test and the system exerciser are used to troubleshoot the memory circuits. Enter TEST B to run self-test. Then enter TEST 50 to see the results or enter TEST 80000106 and press RETURN, then enter B in response to the ?>>> prompt to run the Field Service system exerciser on just the memory circuits (loopback are required, see Section 2.5.1).

A code of 00XX.0001 (self-test) next to the MEM mnemonic indicates no errors detected with the memory circuits (the XX is the total amount of memory installed in the system (in hexadecimal)). If an error is detected, see Section 2.6.1 to determine whether the system module or one of the memory modules needs to be replaced.

A code of 0XXX.0001 (system exerciser) next to the MEM mnemonic indicates no errors detected with the memory circuits (the XXX is the number of pages of memory tested during the last pass of the exerciser (1 page = 512 bytes)). Table 2-3 lists the MEM system exerciser error codes and lists which module needs to be replaced when an error is detected.

Table 2-3 MEM System Exerciser Error Codes

Error Codes	Definition
0XXX.0001	No error. XXX = number of pages tested.
0001.000F	Operating system error.
0002.000F	Operating system error.
0003.000F	Operating system error.
0004.000F	Operating system error.
0005.000F	Operating system error.
0006.000F	Operating system error.
0007.000F	Operating system error.
0008.000F	Operating system error.
0001.001F	Compare error on system module.
0002.001F	Compare error on an option module.
0001.002F	Parity error on system module.
0002.002F	Parity error on an option module.

2.6.1 Additional MEM Information

The Configuration display provides additional information about the memory in the system. Figure 2–4 shows an example of the MEM information in the configuration display.

Figure 2–4 Configuration Display MEM Information

```
MEM          0004.0020   ①
  00400000 00000003
      ②         ③
```

① The first four digits indicate the amount of memory available if no errors are detected. The second four digits contain a status code for the memory.

② This code repeats the amount of memory in the system. Table 2–4 explains the codes.

③ This code contains the location of the failed memory. It is displayed only if an error is detected.

Table 2–4 Hexadecimal Memory Codes

Codes	Mb of Memory
00400000	4Mb
00800000	8Mb
01000000	16Mb
01400000	20Mb
01800000	24Mb
01C00000	28Mb
02000000	32Mb

If the 8-digit error code, ❺, appears, there is an error in one or more of the memory modules. A code other than 0 in any of the digits indicates a faulty module. The module indicated by that digit depends on the configuration as shown in Table 2–5.

Table 2–5 Locating a Failed Memory Bank

	8-Digit Error Code for MEM							
Installed Memory	**1**	**2**	**3**	**4**	**5**	**6**	**7**	[illegible]
System module	0	0	0	0	0	0	0	[illegible]
4Mb module	0	0	0	0	0	0	4	[illegible]
12Mb module	0	0	0	0	12	12	12	S
16Mb module	0	0	0	16	16	16	16	S
4Mb and 16Mb modules	0	0	16	16	16	16	4	S
12Mb and 16Mb modules	16	16	16	16	12	12	12	S

S—Represents the system module
4—Represents the 4Mb memory module
12—Represents the 12Mb memory module
16—Represents the 16Mb memory module

Figure 2–5 shows a typical error code for MEM in the configuration display.

Figure 2–5 Configuration Display MEM Error Code Example 1

```
MEM         0020.0020
   02000000 10002000
```

In this example, digits 1 and 5 of the error code are not zero. The system has 32Mb of memory, therefore the 12Mb and 16Mb memory modules are installed. Table 2–5 indicates that when the 12Mb and 16Mb modules are installed, digits 1 and 5 indicate errors on the 16Mb module and the 12Mb module respectively.

Figure 2–6 shows another MEM error code example.

Figure 2–6 Configuration Display MEM Error Code Example 2

```
MEM         0020.0020
   01000000 00003003
```

In this example, digits 5 and 8 of the error code are not zero. The system has 16Mb of memory, therefore the 12Mb memory module is installed. Table 2–5 indicates that when only the 12Mb module is installed, digits 5 and 8 indicate errors on the 12Mb module and the system module respectively.

A code other than zero in digit 8 always indicates an error in the system module memory.

See Appendix E for a complete list of the power-up and self-test error codes. See Appendix F for a complete list of the system exerciser error codes.

2.7 TEST A — MM — Memory Management

The memory management circuits control the allocation of physical and virtual memory.

Self-test is used to troubleshoot the memory management circuits. The system exerciser does not test the MM circuits directly. They are tested when the system exerciser is run on the memory. Enter TEST A to run self-test. Enter TEST 50 to see the results.

A code of 0000.0001 next to the MM mnemonic indicates no errors detected with the memory management circuits. Replace the system module if any other code is listed.

See Appendix E for a complete list of the power-up and self-test error codes.

2.8 TEST 9 — FP — Floating Point

The floating point (FP) controls the arithmetic operations done for the CPU. Self-test is used to troubleshoot the floating point circuits. The system exerciser does not test the FP circuits. Enter TEST 9 to run self-test. Enter TEST 50 to see the results.

A code of 0000.0001 next to the FP mnemonic indicates no errors detected with the floating point circuits. Replace the system module if any other code is listed. See Appendix E for a complete list of the power-up and self-test error codes.

2.9 TEST 8 — IT — Interval Timer

The interval timer (IT) controls key timing operations in the system.

Self-test is used to troubleshoot the interval timer circuits. The system exerciser does not test the IT circuits. Enter TEST 8 to run self-test. Enter TEST 50 to see the results.

A code of 0000.0001 next to the IT mnemonic indicates no errors detected with the interval timer circuits. Replace the system module if any other code is listed. See Appendix E for a complete list of the power-up and self-test error codes.

2.10 TEST 7 — SCSI-A Bus

The SCSI-A bus is an internal device bus; no external devices can be connected to this bus. It supports two devices only: the RZ23 system disk and a back-up device, a TZ30 tape drive, an RZ23 disk drive or an RX23 diskette drive. The system disk uses small computer system interface (SCSI) address ID 3; the TZ30, RX23, or RZ23 uses SCSI address ID 5.

In InfoServer 100 systems, the RZ23 system disk MUST be set to ID 1, and the RRD40 or RRD42 on SCSI-A bus MUST be set to ID 2.

The procedures for troubleshooting devices on any SCSI bus are similar. Look at the drives installed in the system unit and at any expansion boxes connected and make sure their cables are connected correctly. Enter SHOW DEVICE at the console prompt (>>>) to determine what drives are installed on the SCSI bus you are troubleshooting. This command lists all drives and devices operating in the system and lists which drive is on which SCSI bus. See Section 2.12 for further information on troubleshooting either the SCSI-A bus or the SCSI-B bus.

2.11 TEST 6 — SCSI-B — SCSI-B Bus

The SCSI-B bus is an internal and external device bus.

In Model 10 systems, one internal device and four external devices, or five external devices can be connected to the bus. The internal device which can be connected is the RZ23 disk drive.

In Model 20 systems, up to three internal devices and four external devices can be connected to the bus. The internal devices which can be connected include one RZ23 or one RX23 on the lower drive mounting panel and two RZ23s on the upper drive mounting panel.

In InfoServer 100 systems, a second RRD40 or RRD42 may be connected internally on the SCSI-B bus and is set to ID 5. Up to six additional SCSI devices may be attached externally. If there is no internal device, seven external SCSI devices may be attached. Note that the BC19J-1E SCSI cable must be used as the external interconnect cable to ensure that bus length restrictions are met.

NOTE

SCSI IDs of expansion boxes are determined by the SCSI ID switch positions on the device. To simplify explanations, the SCSI IDs mentioned in this chapter are the default values. They may have been changed by the customer depending on the system configuration.

External devices that can be connected include the RRD40 and RRD42 compact disc expansion boxes, the RZ55 and RZ56 hard disk drive expansion boxes, the TK50Z tape drive expansion box, and other Digital qualified SCSI devices. Any combination in which these devices are connected is dependent on SCSI ID assignments.

If there are any other devices on the SCSI-B bus, be sure to note the type of device and their SCSI addresses since they might be the cause of the problem on the bus.

The procedures for troubleshooting devices on any SCSI bus are similar. See Section 2.12 for further information on troubleshooting either the SCSI-A bus or the SCSI-B bus.

2.12 General SCSI Bus Troubleshooting

To troubleshoot an SCSI bus and its controller (SCSI-A or SCSI-B), run self-test or the system exerciser.

2.12.1 Self-Test

Run self-test to get a quick status of the SCSI buses and the drives on those buses including any devices connected to the SCSI port on the back of the system box.

CAUTION

An SCSI terminator must be connected to the SCSI port if no external boxes are connected or to the last daisy-chained box connected to the SCSI port.

Enter TEST 6 or TEST 7 depending on which SCSI bus you are troubleshooting. Enter TEST 50 to see the results of self-test.

Table 2–6 Self-Test Commands on the SCSI Buses

SCSI Bus	Test Number
SCSI-A	7
SCSI-B	6

2.12.1.1 Self-Test Codes Explained

Figure 2–7 shows an example of SCSI-B codes in the configuration table (SCSI-A codes are similar). There is one line for the status of the SCSI bus controller and one line that contains the status for all drives on that SCSI bus. The status of the SCSI bus controller is next to the SCSI-B mnemonic (first line 0000.XXXX) and each drive status is listed by SCSI address order in the second line.

Figure 2–7 Self-Test Example on the SCSI-B Device

```
SCSI-B     1C1C.0001  V1.0
00000001 00000001 00000001 00000001 05000001 01000001 FFFFFF03 FFFF
    1        2        3        4        5        6        7        8
```

1. RZ23 or RX23 on lower drive mounting panel
2. RZ55 expansion box
3. RZ23 on upper drive mounting panel
4. RZ23 on upper drive mounting panel
5. RRD40 expansion box

- TK50Z expansion box
- SCSI-B bus controller
- Reserved for expansion

An easy way to determine if any errors are detected is by looking for the question marks in the left column. If there are question marks, then one or more of the drives on the bus are faulty. To determine which device is faulty, examine the status codes of the drives (second line). The address IDs are numbered 0 through 7 from left to right. Table 2–7 lists the normal status codes for each SCSI device available in the system. Any code other than those previously listed indicates an error in the device at that SCSI address ID.

Table 2–7 SCSI Devices Self-Test Status Codes

Status Code	SCSI Device
FFFFFF05	Device is off-line or not installed at this address.
FFFFFF03	SCSI bus controller.
FFFFFFFF	Device not tested - possible SCSI bus controller error.
00000001	RZ23 disk drive, RZ55 disk drive, or RX23 diskette drive.
01000001	TZ30 or TK50Z tape drive.
05000001	RRD40 compact disc drive.

If a drive is configured for an address ID that indicates FFFFFF05, check the drive's cabling and power source, then retest. If the code is still FFFFFF05 after retesting, replace the drive.

See Appendix E for a complete list of self-test error codes.

2.12.2 System Exerciser

Enter TEST 0 to start the system exerciser in customer mode. Enter TEST 101 or TEST 102, at the console prompt, or enter TEST 80000106 and press RETURN, then enter 6 or 7 at the ?>>> prompt to start the system exerciser in Field Service mode. The customer mode system exerciser does not perform reads or writes to the drives. The Field Service mode system exerciser performs a complete read/write test on the tape drive, diskette drive, and the disk drives (on reserved diagnostics blocks), performs reads on the compact disc drive (if test disk is loaded), and also performs data transfer tests on all drives. For Field Service mode to run correctly, you must install the loopback on the serial line ports, load

the special-keyed tape cartridge[1] and diskette[2] into the tape drive and diskette drive respectively, and load the RRD40 test disc before starting the system exerciser. See Section 2.5.1 for more information on installing the loopback connectors.

The first pass of the system exerciser on an SCSI bus tests the SCSI bus controller and, if the SCSI bus controller is operating correctly, checks the SCSI bus for the presence of any drives. It does not perform any diagnostics or any data transfer tests on the drives during the first test pass. If the SCSI bus controller is faulty, an error code is listed in the display and the SCSI bus is not checked for the presence of any drives.

2.12.2.1 System Exerciser Codes Explained

Figure 2–8 shows the system exerciser display for SCSI-B (SCSI-A codes are similar). There is one line for the status of the SCSI bus controller and one line for each of the drives installed on the SCSI bus. The status of the SCSI bus controller is next to the SCSI-B mnemonic (first line) and the status of each drive is listed under the bus controller's code (separate line for each drive).

---

[1] TEST 73 writes a special key to a tape cartridge.

[2] TEST 74 writes a special key to a diskette.

Figure 2–8 System Exerciser Example for SCSI-B Device

```
6   00A0   SCSI-B   6000.0001   4   0000   0 00:03:18
                    0200.0001 ❶
                    1100.0001 ❷
                    2200.0001 ❸
                    3200.0001 ❹
                    4100.0001 ❺
                    5300.0001 ❻
```

❶ RZ55 expansion box.

❷ RX23 holding a write-protected diskette (1300.0001 if the diskette is not write protected).

❸ RZ23.

❹ RZ23.

❺ RRD40 expansion box.

❻ TK50Z expansion box.

An easy way to determine if any errors are detected is by looking for the question marks in the left column. If there are any question marks on the SCSI bus controller's status line, the SCSI bus controller is probably faulty and the error code identifies the problem. If there are any question marks on a drive's status line, the problem could be in either the drive, the SCSI bus cabling or terminator, or the SCSI bus controller. For example, an error that is listed in the drive's code may be a data transfer error and does not isolate the problem to the device itself; it may still be in the SCSI bus controller.

See Appendix F for a complete list of the system exerciser error codes.

2.12.3 Additional SCSI Bus Information

The SCSI bus controller controls up to seven SCSI devices on the SCSI bus. The SCSI-B bus can have internal and external devices connected. The internal devices include the RZ23 disk drive, the TZ30 tape drive, and the RX23 diskette drive. The external devices include the TK50Z expansion box, the RZ55 disk expansion box, and the RRD40 compact disc expansion box.

All of the expansion boxes connect to the SCSI port on the back of the system box using a daisy-chain cabling scheme. An SCSI terminator must be installed on the connector of the last expansion box or installed on the SCSI port connector if expansion boxes are not used.

Each device on the SCSI bus, including the SCSI bus controller, has its own address ID location. The SCSI bus controller always holds the address ID of 6 for all buses. Table 2–8 shows the address ID assignments for both buses.

Table 2–8 SCSI Bus Address ID Assignments (both buses)

ID	SCSI-A Bus	ID	SCSI-B Bus
7	Unused	7	Reserved for expansion
6	SCSI-A bus controller	6	SCSI-B bus controller
5	TZ30, RX23, RZ23	5	TK50Z expansion box
4	Unused	4	RRD40 expansion box
3	RZ23 (system disk)	3	RZ23
2	Unused	2	RZ23
1	Unused	1	RZ55 expansion box
0	Unused	0	RZ23, RX23

NOTE

Model 10 systems do not contain as many internal storage devices as Model 20 systems; however, both systems use the same SCSI ID assignments, as listed in Table 2–8. InfoServer 100 systems have different SCSI-A bus assignments. The system disk, RZ23E or RZ23L, MUST be ID 1 and the internal RRD40 or RRD42 compact disc drive on SCSI-A bus MUST be ID 2. InfoServer 100 systems do not support the TZ30 or the RX23.

Enter SHOW DEVICE at the console prompt (>>>) to determine the SCSI address ID of the devices on the SCSI-A or SCSI-B bus. This command displays all devices connected to the SCSI bus controllers. This display lists the SCSI address ID of all devices on SCSI buses. Figure 2–9 gives an example of this command.

Figure 2–9 Example of the SHOW DEVICE Command

```
>>> SHOW DEVICE
VMS/VMB   ULTRIX  ADDR       DEVTYP  NUMBYTES   RM/FX  WP   DEVNAM
-------   ------  ----       ------  --------   -----  --   ------
ESA0      SE0    08-00-2B-03-79-1F ❶
DKA300    RZ3    A/3/0/00    DISK    104   MB   FX          RZ23
MKA500    TZ5    A/5/0/00    TAPE    ........   RM
...HostID....    A/6         INITR ❷
DKB200    RZ10   B/2/0/00    DISK    104   MB   FX          RZ23
DKB300    RZ11   B/3/0/00    DISK    104   MB   FX          RZ23
DKB400    RZ12   B/4/0/00    RODISK  593   MB   RM     WP   RRD40
...HostID....    B/6         INITR
   ❸       ❹       ❺          ❻        ❼         ❽     ❾     ❿
>>>
```

❶ ESA0 — the Ethernet device and the Ethernet address of the system.

❷ ...HostID... — the SCSI bus controller.

❸ Device numbers for VAX/VMS operating systems.

❹ Device numbers for ULTRIX operating systems.

❺ Address.

❻ Device type.

❼ Number of megabytes.

❽ Removable or fixed media.

❾ Write protected.

❿ Device name.

If the system does not contain a full configuration of drives internally, additional expansion boxes can be connected to the SCSI-B port using one of the unused SCSI address ID locations. Section 2.12.4 explains how to set the proper SCSI address ID for all devices.

2.12.4 SCSI Bus Address ID Settings

This section shows how each SCSI device's address ID is determined and set.

The jumpers and switches shown in the following figures are set to the recommended SCSI address ID for each drive.

It is sometimes necessary to change the default setting. When two devices with the same default address ID are installed on an SCSI bus, the address ID of one of the devices must be changed. This is because no two devices on an SCSI bus can have the same address ID. The SCSI Address ID on the second device must be set to any one of the unused valid address IDs (0 to 7) on that bus. Remember that both SCSI buses operate independently as far as address IDs are concerned.

2.12.4.1 Setting the SCSI ID on the TZ30

Figure 2–10 shows the location of the SCSI ID switches on the TZ30 tape drive. Table 2–9 lists the switch settings corresponding to the possible SCSI IDs.

Figure 2–10 TZ30 SCSI ID Switch Locations

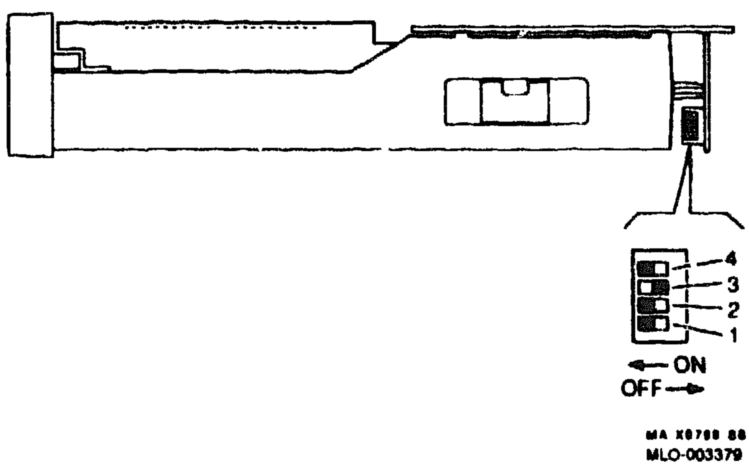


Table 2–9 TZ30 SCSI ID Switch Settings

Address ID on	TZ30 Tape Drive Switch Settings			
SCSI Bus	4	3	2	1
0	Off	Off	Off	On
1	On	Off	Off	On
2	Off	On	Off	On
3	On	On	Off	On
4	Off	Off	On	On
5[2]	On	Off	On	On
6[1]	Off	On	On	On
7	On	On	On	On

[1]Reserved address ID for SCSI bus controller

[2]Recommended address ID for the TZ30 tape drive

2.12.4.2 Setting the SCSI ID on the RZ23

Figure 2–11 shows the location of the SCSI ID switches on the RZ23 hard disk drive. Table 2–10 lists the SCSI ID jumper combinations.

Figure 2-11 RZ23 SCSI ID Jumper Locations

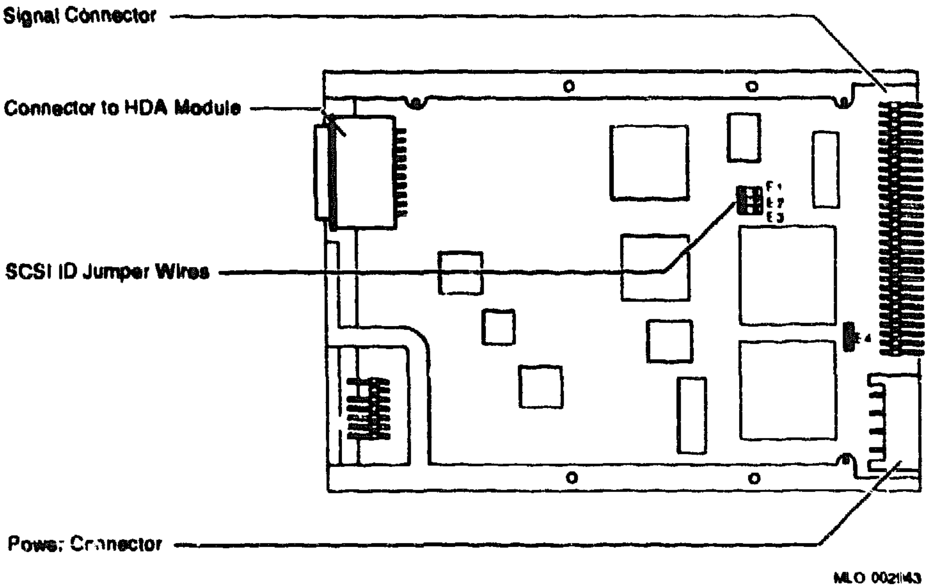


Table 2-10 RZ23 SCSI ID Jumper Combinations

Address ID on SCSI Bus	RZ23 Jumper Settings E1	E2	E3	E4
0	Out	Out	Out	Out
1†	In	Out	Out	Out
2†	Out	In	Out	Out
3[2]†	In	In	Out	Out
4	Out	Out	In	Out
5[2]	In	Out	In	Out
6[1]	Out	In	In	Out
7	In	In	In	Out

[1]Reserved address ID for SCSI bus controller.

[2]Recommended address IDs for the RZ23 drives on SCSI-A bus.

†Recommended address IDs for the RZ23 drives on SCSI-B bus.

2.12.4.3 Setting the SCSI ID for the RX23

The SCSI ID for the RX23 is set on the FDI board. Figure 2–12 shows the location of the SCSI ID switches on the FDI board. Table 2–11 lists the SCSI ID switch settings.

Figure 2–12 FDI Board SCSI ID Switch Positions

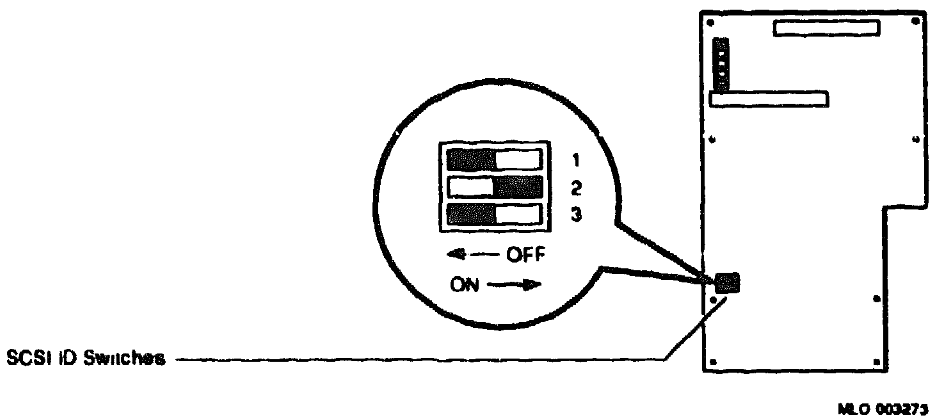


Table 2–11 RX23 SCSI ID Switch Settings

Address ID on SCSI Bus	RX23 Switch Settings 1	2	3
0[3]	Off	Off	Off
1	Off	Off	On
2	Off	On	Off
3	Off	On	On
4	On	Off	Off
5[2]	On	Off	On
6[1]	On	On	Of
7	On	On	On

[1]Reserved address ID for SCSI bus controller.

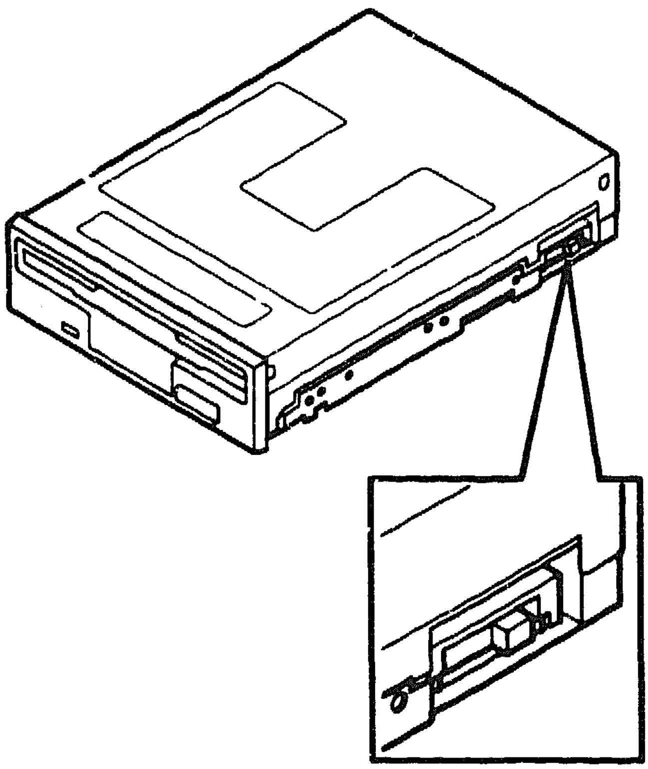
[2]Recommended address IDs for the RX23 drives on SCSI-A bus.

[3]Recommended address IDs for the RX23 drives on SCSI-B bus.

RX23 Diskette Drive Select Switch Settings

Figure 2-13 shows the only valid switch setting for an RX23 diskette drive. It should be set to the zero position which is all the way towards the back.

Figure 2-13 RX23 Select Switch Setting



2.12.4.4 Setting the SCSI ID on the RRD40

Figure 2-14 shows the location of the SCSI ID switches on the RRD40 compact disc drive expansion box. Table 2-12 lists the switch settings corresponding to the possible SCSI IDs.

Figure 2–14 RRD40 SCSI ID Switch Locations

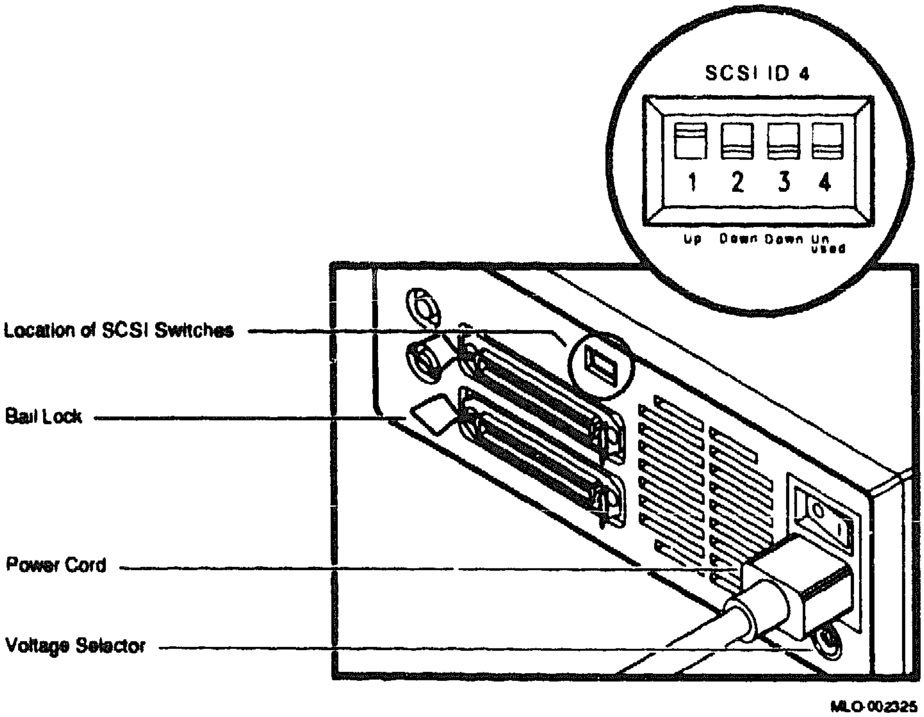


Table 2–12 RRD40 SCSI ID Switch Settings

Address ID on	RRD40 Expansion Box Switch Settings			
SCSI Bus	**1**	**2**	**3**	**4†**
0	Down	Down	Down	Not used
1	Down	Down	Up	Not used
2	Down	Up	Down	Not used
3	Down	Up	Up	Not used
4[2]	Up	Down	Down	Not used
5	Up	Down	Up	Not used
6[1]	Up	Up	Down	Not used
7	Up	Up	Up	Not used

[1] Reserved address ID for SCSI bus controller.

[2] Recommended address ID for the RRD40 compact disc drive.

† Because switch 4 is unused, it can be in either position.

2.12.4.5 Setting the SCSI ID on the RZ55

Figure 2–15 shows the location of the SCSI ID switches on the RZ55 hard disk drive expansion box. Table 2–13 lists the SCSI ID switch settings.

Figure 2–15 RZ55 Expansion Box SCSI ID Switch Locations

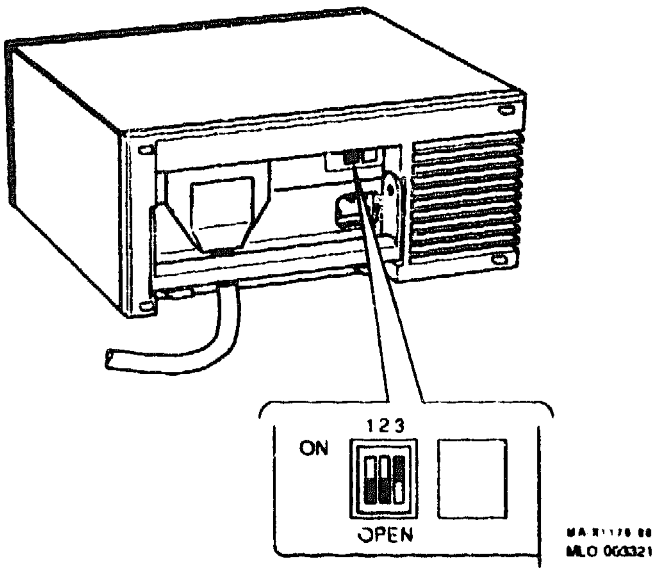


Table 2-13 RZ55 SCSI ID Switch Settings

Address ID on SCSI Bus	RZ55 Expansion Box Switch Settings 1	2	3
0	Down	Down	Down
1[2]	Down	Down	Up
2	Down	Up	Down
3	Down	Up	Up
4	Up	Down	Down
5	Up	Down	Up
6[1]	Up	Up	Down
7	Up	Up	Up

[1]Reserved address ID for SCSI bus controller.

[2]Recommended address ID for the RZ55 expansion box.

2.12.4.6 Setting the SCSI ID on the TK50Z-GA

Figure 2-16 shows the location of the SCSI ID switches on the TK50Z-GA type tape drive expansion box. Table 2-14 lists the SCSI ID switch settings.

Figure 2–16 TK50Z-GA SCSI ID Switch Locations

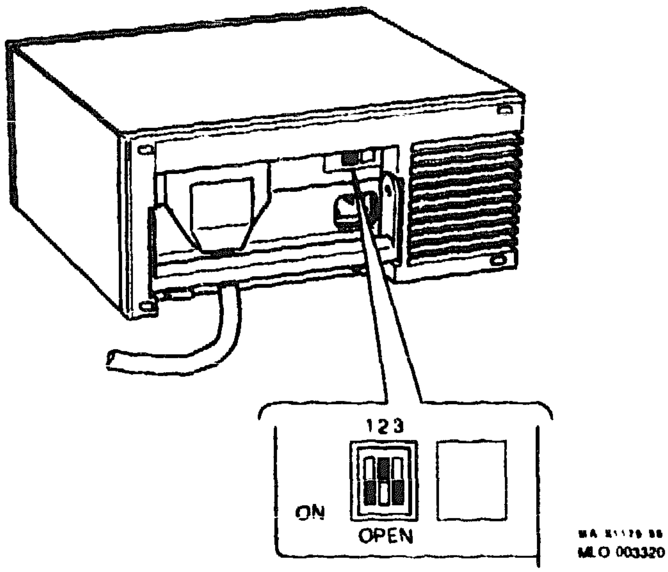


Table 2–14 TK50Z-GA SCSI ID Switch Settings

Address ID on SCSI Bus	TK50Z-GA Expansion Box Switch Settings [1] 1	2	3
0	Up	Up	Up
1	Up	Up	Down
2	Up	Down	Up
3	Up	Down	Down
4	Down	Up	Up
5[3]	Down	Up	Down
6[2]	Down	Down	Up
7	Down	Down	Down

[1]The switch convention is the opposite to the RZ55 SCSI ID switch convention.

[2]Reserved address ID for SCSI bus controller.

[3]Recommended address ID for the TK50Z-GA expansion box.

2.13 Troubleshooting a Tape Drive (TEST 6 or 7)

This section describes how to troubleshoot a TZ30 tape drive in the system box or the TK50 tape drive in the TK50Z expansion box. This section assumes you know how to read, decipher, and understand the SCSI bus operation, its codes, and its address ID settings. See Section 2.12 for further information about the SCSI bus operation if you are not familiar with this type of bus. Otherwise, the next two paragraphs explain the self-test and the system exerciser results for the tape drive. Enter SHOW DEVICE to check the SCSI address ID of the tape drive and to determine which bus it is on.

Self-test results for the tape device should contain 01000001 in the SCSI address ID 5 location. A code of FFFFFF05 indicates that the device is not installed, not powered up, or faulty. A code of FFFFFFFF indicates that the device was not tested because of an SCSI bus controller error. Any code other than those previously mentioned indicates an error with the tape device, a cabling problem, or an error with the SCSI bus controller. Run the internal self-test on the TK50Z expansion box if there is a problem with the external tape device. See Section 6.3.1. Otherwise, replace the internal TZ30 tape device and retest the system. Replace the system module if replacing the TZ30 tape device did not fix the problem.

When running the system exerciser in Field Service mode with the special keyed tape cartridge installed, the code for the tape device shows that it is not writable (5100.0001) during the first pass. However, the subsequent passes should show that it is removable and writable (5300.0001) as long as the cartridge has a valid special key on it and the SCSI bus controller is operating correctly. So you must wait for the system exerciser to complete at least two passes to see if the tape drive (address ID 5 in this case) is operating correctly.

2.14 Troubleshooting an RZ23 Disk Drive (TEST 6 or 7)

This section describes how to troubleshoot an RZ23 disk drive. This section assumes you know how to read, decipher, and understand the SCSI bus operation, its codes, and its address ID settings. See Section 2.12 for further information about the SCSI bus operation if you are not familiar with this type of bus. Otherwise, the next two paragraphs explain the self-test and the system exerciser results for the RZ23 disk drive at SCSI address IDs 3 and 5 on SCSI-A bus and address IDs 1, 2, or 3 on SCSI-B bus. Enter SHOW DEVICE to check the SCSI address IDs of the disk drives and to determine which bus they are on.

Self-test results for each disk drive should contain 00000001 in the SCSI address locations occupied by the disk drives. A code of FFFFFF05 indicates that the device is not installed, not powered up, or faulty. A code of FFFFFFFF indicates that the device was not tested because of an SCSI bus controller error. Any code other than those previously listed indicates an error with the disk drive at that address ID location, a cabling problem, or an error with the SCSI bus controller.

When running the system exerciser in Field Service mode, the code for the disk drive shows that it is writable and that no errors are present (1200.0001, 2200.0001, 3200.0001, or 5200.0001). Any error code other than those previously listed indicates an error is most likely on the disk, but never rule out the possibility of an error on the SCSI bus controller itself.

2.15 Troubleshooting an RX23 Diskette Drive

This section describes how to troubleshoot an RX23 diskette drive. This section assumes you know how to read, decipher, and understand the SCSI bus operation, its codes, and its address ID settings. See Section 2.12 for further information about the SCSI bus operation if you are not familiar with this type of bus. Otherwise, the next two paragraphs explain the self-test and the system exerciser results for the RX23 disk drive at SCSI address ID 5 on SCSI-A bus and address ID 0 on SCSI-B bus. Enter SHOW DEVICE to check the SCSI address ID of the diskette drives and to determine which bus they are on.

Self-test results for each diskette drive should contain 00000001 in the SCSI address locations occupied by the disk drives. A code of FFFFFF05 indicates that the device is not installed, not powered up, or faulty. A code of FFFFFFFF indicates that the device was not tested because of an SCSI bus controller error.

When running the system exerciser in Field Service mode, a code of 1100.0001 for the disk drive shows that it is write protected, does not contain the special diagnostic key, and that no errors are present. A code of 1300.0001 for the disk drive shows that it is not write protected, contains the special diagnostic key, and that no errors are present.

Any error code other than those previously listed indicates an error on the special keyed diskette, the FDI board, or the diskette drive. If an error code is displayed, replace the special keyed diskette and run the tests again. If that fails to solve the problem, replace the FDI board. Run the tests again. If the system still displays the error, replace the RX23 diskette drive.

Never rule out the possibility of an error on the SCSI bus controller itself. If replacing the special keyed diskette, FDI board, or diskette drive failed to solve the problem, replace the system module.

2.16 Troubleshooting an RRD40 or an RRD42 Compact Disc Drive (TEST 6)

This section describes how to troubleshoot an RRD40/42 compact disc drive expansion box. This section assumes you know how to read, decipher, and understand the SCSI bus operation, its codes, and its address ID settings. See Section 2.12 for further information about the SCSI bus operation if you are not familiar with this type of bus. Otherwise, the next two paragraphs explain the self-test results and the system exerciser results for the RRD40/42 compact disc drive at SCSI address ID 4. Enter SHOW DEVICE to check the SCSI address ID of the RRD40/42 drive.

Self-test results for the RRD40/42 drive should contain 05000001 in the SCSI address ID 4 location. A code of FFFFFF05 indicates that the device is not installed or not powered up. A code of FFFFFFFF indicates that the device was not tested because of a SCSI bus controller error. Any code other than those previously listed indicates an error with the compact disc drive, a cabling problem, or an error with the SCSI bus controller. The RRD40/42 expansion box is one FRU (no replaceable FRUs inside the box) and the whole box must be replaced if an error is detected. Be sure that the SCSI bus terminator is connected to the last expansion box on the daisy chain.

InfoServer 100 systems may have one or two internal RRD40 or RRD42 compact disk drives. The CD on the SCSI-A bus MUST be set to address ID 2; the CD on the SCSI-B bus is set to ID 5.

When running the system exerciser in Field Service mode with the RRD40/42 test disk installed, the code for the disk drive shows that it is removable and that no errors are present (4100.0001). The test disk contains known errors embedded to test the error correction code (ECC) logic. However, any disk can be installed to perform read testing on the RRD40/42. Any error code other than those previously listed indicates an error is most likely on the compact disk or its controller module, but never rule out the possibility of an error on the SCSI bus controller itself.

2.17 TEST 5 — SYS — Interrupt Controller and Ethernet ID ROM

The interrupt controller manages the device interrupts in the system and checks the Ethernet ID ROM for valid contents.

Self-test is used to troubleshoot the SYS circuits. The system exerciser does not test the SYS circuits. Enter TEST 5 to run self-test. Enter TEST 50 to see the results.

A code of 0000.0001 next to the SYS mnemonic indicates no errors detected with the SYS circuits. Replace the system module if any other code is listed (except 0000.0004 as described in the following section).

2.17.1 Additional SYS Information

A code of 0000.0004 next to the SYS mnemonic indicates an error in the Ethernet ID ROM. Since the ROM is not an FRU, you must replace the system module.

CAUTION

If the Ethernet ID ROM has failed, do not put the old ROM on the new system module. Instead, replace the system module and notify the system manager of the new Ethernet ROM address.

See Appendix E for a complete list of the the power-up and self-test error codes.

2.18 TEST 4 — DSH32-B Asynchronous Subsystem (DSH32-A)

The DSH32-A subsystem controls the eight-asynchronous communication port on the rear of the system unit. The DSH32-A subsystem asynchronous line drivers are located on the distribution board and are controlled from the DSH32-B communications module. The asynchronous port on the rear of the system unit has eight data-only communication lines to which terminals or other peripheral devices can be connected through an asynchronous cable and an eight-MMJ port cable concentrator.

Self-test and the system exerciser are used to troubleshoot the DSH32-A subsystem. Enter TEST 4 to run the self-test. Then enter TEST 50 to see the results. Enter TEST 80000106 and and press RETURN, then enter 4 in response to the ?>>> prompt to run the Field Service system exerciser on the DSH32-A subsystem only. Figure 2–17 shows an example running the system exerciser on the DSH32-A subsystem.

Figure 2–17 Running the System Exerciser on the DSH32-A Subsystem

```
>>> TEST 80000106
?>>> 4
```

A code of 00FF.0001 next to the DSH32-A mnemonic indicates no errors detected in DSH32-A subsystem. Replace the DSH32-B communications module or the distribution board if any other code is listed.

2.18.1 Additional DSH32-A Information

Install a H3101 36-pin loopback on the eight-asynchronous port when running the tests in Field Service mode on the DSH32-B communications module, distribution board, and internal cabling.

Install the loopback on the end of the asynchronous cable when running tests in Field Service mode on the cable.

Install the MMJ loopbacks in one or more of the MMJ ports on the cable concentrator when running tests in Field Service mode on that attachment.

The loopback connectors are not needed during customer mode testing because the DSH32-A uses internal loopback switches for transmission testing.

During Field Service mode testing, the asynchronous line drivers are fully tested. Characters are sent out to the each asynchronous line. They are verified as they are looped back into the port's receiver. If a loopback connector is not installed or the wrong character is received, an error code is listed in the DSH32-A code for that port.

2.18.1.1 Self-Test Codes Explained

Enter TEST 4 to run the self-test on the DSH32-A subsystem. When the test has completed, enter TEST 50 to view the configuration display. Figure 2–18 shows an example of the DSH32-A information in the configuration display.

Figure 2–18 Configuration Display DSH32-A Information

```
DSH32-A    00FF.0001 V2.0
   ❶        ❷    ❸    ❹
```

❶ The device identifier, in this case, the DSH32-A subsystem.

❷ A bitmap, in hexadecimal, that indicates which of the asynchronous lines are working. See Figure 2–20.

❸ A device error code.

❹ The revision level of the device.

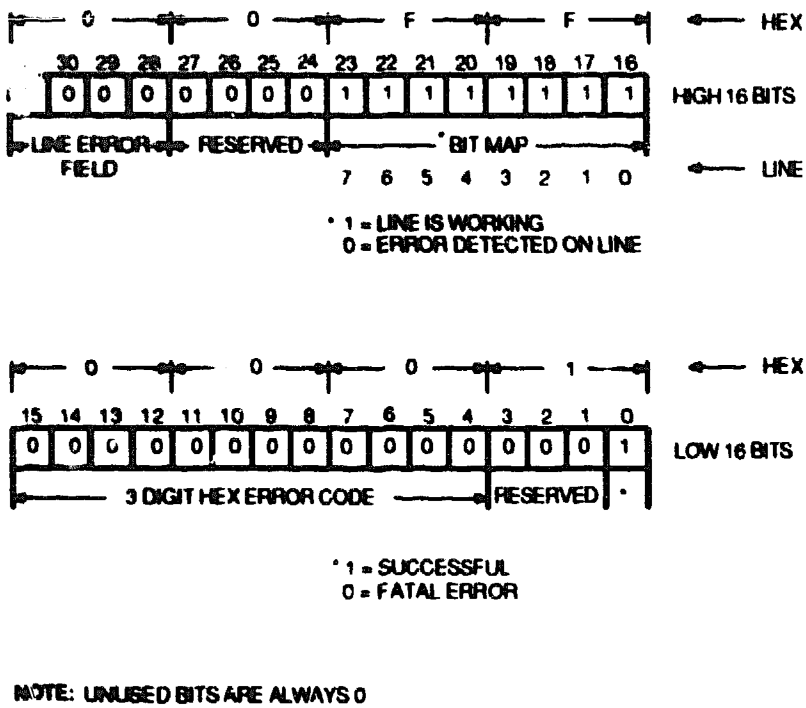
Figure 2–19 shows a typical error code for DSH32-A in the configuration display.

Figure 2–19 Configuration Display DSH32-A Error Code Example 2

```
DSH32-A    00B7.00A0 V2.0
```

To determine which asynchronous lines are working, convert B7 into binary format, giving 10110111. Therefore asynchronous lines 7, 5, 4, 2, 1, and 0 are operating normally, while lines 6 and 3 are faulty, as indicated in Figure 2–20.

Figure 2–20 Error Code Format for the DSH32-A Subsystem



See Appendix E for a complete list of the power-up and self-test error codes.

2.18.1.2 System Exerciser Codes Explained

Run the system exerciser on the DSH32-A subsystem only. Figure 2–21 shows the command to do this.

Figure 2–21 Running the System Exerciser on the DSH32-A Subsystem

```
>>> TEST 80000106 [Return]
?>>> 4 [Return]
```

Figure 2–22 shows an example of the DSH32-A information in the system exerciser display.

Figure 2–22 System Exerciser DSH32-A Information

```
4    81F0    DSH32-A     00FF.0001 ①        2     0 00:04:54
                       ② 0001.0001 ③
                       ④ 0001.0001 ⑤
                       ⑥ 0001.0001 ⑦
                       ⑧ 0001.0001 ⑨
```

① Status code and error code for the DSH32-A subsystem.

② Status for line 1.

③ Status for line 0.

④ Status for line 3.

⑤ Status for line 2.

⑥ Status for line 5.

⑦ Status for line 4.

⑧ Status for line 7.

⑨ Status for line 6.

The normal status code and error code for the DSH32-A subsystem is 00FF.0001. The normal status code for each line is 0001. Any other codes displayed indicate an error.

Figure 2–23 shows a typical error code for DSH32-A in the system exerciser display.

Figure 2–23 System Exerciser DSH32-A Error Code Example

```
4    81F0    DSH32-A     007F.0321         2     0 00:04:54
                         0001.0001
                         0001.0001
                         0001.0001
                         0321.0001
```

In this example, line 7 displays an error code because data was lost on that line. The code 007F.0321, which indicates the overall status of the DSH32-A subsystem, shows that line 7 was dropped by displaying 7F. (Section 2.18.1.1 describes how to decipher this bitmap.) The code 0321

on the first line shows that the error was the last error detected. The status code for each line holds the error code for that line's failure or success.

See Appendix F for a complete list of the system exerciser error codes.

2.19 TEST 3 — DSH32-B Synchronous Subsystem (DSH32-S)

The DSH32-S subsystem controls the synchronous communications port on the rear of the system unit. The DSH32-S subsystem synchronous line driver is located on the distribution board and is controlled from the DSH32-B communications module.

Self-test and the system exerciser are used to troubleshoot the DSH32-S subsystem. Enter TEST 3 to run the self-test. Then enter TEST 50 to see the results. Enter TEST 80000106 and and press RETURN, then enter 3 in response to the ?>>> prompt to run the Field Service system exerciser on the DSH32-S subsystem only. Figure 2–24 shows an example of running the system exerciser on the DSH32-S subsystem.

Figure 2–24 Running the System Exerciser on the DSH32-S Subsystem

```
>>> TEST 80000106
?>>> 3
```

A code of 0000.0001 next to the DSH32-S mnemonic indicates no errors detected in DSH32-S subsystem. Replace the DSH32-B communications module or the distribution board if any other code is listed.

2.19.1 Additional DSH32-S Information

Install a H3199 50-pin loopback on the synchronous port when running the tests in Field Service mode on the DSH32-B communications module, distribution board, and internal cabling.

Install the loopback on the end of the synchronous cable when running tests in Field Service mode on that cable. Disconnect the cable from the modem or host computer and install either the H3248 25-pin loopback or the H3198 37-pin loopback on that end of the cable. The H3248 loopback is used when a RS232 cable is connected to the system. The H3198 loopback is used when a RS422 or RS423 cable is connected to the system.

The loopback connectors are not needed during customer mode testing because the DSH32-A uses internal loopback switches for transmission testing.

During Field Se e mode testing, the synchronous line driver is fully tested. Character sent out to the synchronous line. They are verified as they are looped back into the port's receiver. If a loopback connector is not installed or the wrong character is received, an error code is listed in the DSH32-A code for that port.

2.19.1.1 Self-Test Codes Explained

Enter TEST 3 to run the self-test on the DSH32-S subsystem. When the test has completed, enter TEST 50 to view the configuration display. Figure 2–25 shows an example of the DSH32-A information in the configuration display.

Figure 2–25 Configuration Display DSH32-S Information

```
DSH32-S    0000.0001 V2.0
   1         2    3    4
```

1. The device identifier, in this case, the DSH32-S subsystem.
2. The four digits to the left of the period indicate the test number.
3. The four digits to the right of the period indicate the fault code.
4. The revision level of the device.

See Appendix E for a complete list of the power-up and self-test error codes.

2.19.1.2 System Exerciser Codes Explained

Run the system exerciser on the DSH32-S subsystem only. Figure 2–26 shows the command to do this.

Figure 2–26 Running the System Exerciser on the DSH32-S Subsystem

```
>>> TEST 80000106 [Return]
?>>> 3 [Return]
```

Figure 2–27 shows an example of the DSH32-S information in the system exerciser display.

Figure 2–27 System Exerciser DSH32-S Information

```
3   81F1   DSH32-S   0001.0000 ❶   2   0 00:04:54
                     0000.0001 ❷
```

❶ A common module information line holding either the status code and error code for the DSH32-S subsystem or the operating status of the synchronous line.

❷ Status for synchronous port 1.

If the first digit of the common module information line is 0, the operating status of the synchronous line is displayed. The four digits to the left of the period are a bitmap indicating which of the synchronous lines are operating. The four digits to the right are a bitmap indicating those lines that are not operating. Since the DSH32-B communications module in the MicroVAX 3100 and VAXserver 3100 support only one synchronous line, these bitmaps can either be 0001 or 0000. Figure 2–28 and Figure 2–29 show how the system can display these error codes.

Figure 2–28 System Exerciser DSH32-S Example 1

```
3   81F1   DSH32-S   0001.0000 ❶   2   0 00:04:54
```

Figure 2–29 System Exerciser DSH32-S Example 2

```
3   81F1   DSH32-S   0000.0001 ❷   2   0 00:04:54
```

❶ In this example the bitmap representing synchronous port 1 is to the left of the period and therefore port 1 is operating normally.

❷ In this example the bitmap representing synchronous port 1 is to the right of the period and port 1 is faulty.

If the first digit of the common module information line is not zero, a status code and error code for the DSH32-S subsystem is displayed. The four digits to the left of the period indicate the status code. The four digits to the right of the period indicate the error code.

Figure 2–30 shows a typical status code error code for DSH32-S in the system exerciser display.

Figure 2–30 System Exerciser DSH32-S Status Code and Error Code Example

```
??  3   81F1    DSH32-S    1100.7C1C      2     0 00:04:54
                           0000.0001
```

The second line of the display indicates the status of synchronous port 1. A status code of 0000.0001 indicates that the port is operating normally. Any other code indicates an error on the synchronous port. As you can see from the previous example, the synchronous port may display a normal status code even though an error code is displayed for the DSH32-S subsystem.

See Appendix F for a complete list of the system exerciser error codes.

2.20 General DSH32-B Communications Module Troubleshooting

The procedures listed in this section describe how to correct errors detected while running either the self-tests or the system exerciser on the DSH32-A and DSH32-S subsystems.

2.20.1 Self-Test Errors

Run the self-tests on both the DSH32-A and DSH32-S subsystems in Field Service mode. Enter TEST 50 to display the results. Any self-test error code other than 00FF.0001 indicates a fault in the DSH32-A subsystem. An error code other than 0000.0001 indicates a fault in the DSH32-S subsystem. In either case fix the problem by replacing the following FRUs in the order listed:

1. Replace the DSH32-B communications module and run the self-test on both the DSH32-A and DSH32-S subsystems again.
2. If replacing the DSH32-B communications module did not fix the problem, replace the distribution board. Run the self-tests again.
3. If the error is still displayed, replace the cable between the DSH32-B communications module and the distribution board.

4. If the error is still displayed on the DSH32-A subsystem and you are running the self-tests with the asynchronous cable, cable concentrator, and loopbacks connected to the system unit, replace the following items in the order listed:

   a. Replace the asynchronous cable. Run the self-test again.

   b. If the error is still displayed, replace the cable concentrator.

   NOTE

   The self-tests provide the most complete testing of the DSH32-S subsystem. Self-tests support the use of the H3248 and H3198 cable loopbacks while the system exerciser supports only the H3199 50-pin loopback.

5. If the error is still displayed on the DSH32-S subsystem and you are running the self-tests with the synchronous cable and either the H3248 or H3198 loopback connected to the system unit, replace the synchronous cable.

2.20.2 System Exerciser Errors

The DSH32-A and DSH32-S system exercisers are explained in the following sections.

2.20.2.1 DSH32-A System Exerciser

Any error code in the system exerciser other than 00FF.0001 indicates a fault in the DSH32-A subsystem. The following procedure describes how to correct errors discovered in both the Customer and Field service mode system exerciser display:

1. If you are testing the DSH32-A subsystem in Customer mode, and the error code is not 00FF.0001, replace the DSH32-B communications module.

2. If the DSH32-A subsystem passes the self-test but fails the Field Service mode system exerciser, replace the distribution board.

2.20.2.2 DSH32-S System Exerciser

Use the system exerciser to isolate intermittent hardware faults.

A fault is indicated in the DSH32-S subsystem when two question marks appears to the left of the DSH32-S mnemonic on the first or first and second line of the DSH32-S display. The following procedure describes how to correct errors discovered in both the Customer and Field service mode system exerciser display:

1. If two question marks appear on both the first and second line in the display, the error is on the DSH32-B communications module or in the synchronous port on the distribution board.
2. Replace the distribution board. Run the system exerciser again.
3. If the error still appears, then the error is on the DSH32-B communications module and that module should be replaced.

NOTE

The system exerciser tests do not support testing with the H3248 or H3198 loopback connector installed.

2.21 TEST 1 — NI — Ethernet Network

The Ethernet network (NI) circuits control the communication protocol over the ThinWire or standard Ethernet cables. The system contains a ThinWire Ethernet port and a standard Ethernet port on the back of the system box. A switch determines which Ethernet port is enabled for transmission of IEEE 803.2 protocol and an LED lights next to the enabled port.

A code of 0000.0001 (self-test) next to the NI mnemonic indicates no errors detected with the Ethernet circuits. If an error code of xxxx.7001 or higher for ThinWire Ethernet or 0011.700E for standard Ethernet is listed, check the termination of the enabled Ethernet port on the back of the system box and retest. These two codes indicate that the external Ethernet network cable is not terminated correctly (for instance, no loopback on the enabled port). A code of 0100.0001 is normal with the standard Ethernet port enabled until the external Ethernet network is operational. Be sure to set the Ethernet switch to enable the correct Ethernet port. Replace the system module if any other code is listed.

A code of 0000.0001 (system exerciser) next to the NI mnemonic indicates no errors detected with the Ethernet circuits. Replace the system module if any other code is listed.

2.21.1 Additional NI Information

When running self-test on the NI circuits, the Ethernet connector on the back of the system box must be terminated correctly. If an Ethernet cable is connected to the enabled Ethernet port, it must be terminated correctly. If no cable is connected to the enabled Ethernet port, put together a loopback connector. Table 2–15 lists the parts that must be assembled. Connect the loopback to the enabled port before running self-test. If the enabled Ethernet port is not terminated correctly, the NI self-test will detect an error of 0000.7001 or higher for the ThinWire port and 0011.700E for the standard Ethernet port. These termination error codes indicate a possible problem with the Ethernet cable and not necessarily the Ethernet circuits on the system module. If an error still shows up after replacing the system module and verifying the Ethernet cable, replace the power supply. Since the 9 Vdc supply is only used by the Ethernet circuits, a problem with this supply would not cause an error code to appear during the testing of any other device.

See Appendix E for a complete list of the power-up and self-test error codes. See Appendix F for a complete listing of the system exerciser error codes.

Table 2–15 Ethernet Port Loopback Connectors

Item	Part Number	Number of Parts Needed
Standard Ethernet Loopback		
Connector terminator	12-22196-01	1
ThinWire Ethernet Loopback		
T-connector	12-25869-01	1
50 ohm terminator	12-26318-01	2

If power-up testing detects an error with the Ethernet circuits, the SET MOP, SHOW MOP, SET TRIG, SHOW TRIG, and SET PSWD commands may not be usable. An error message when entering these commands indicates this. To reenable these commands, you must fix the error on the Ethernet circuits. If the NI error was an unterminated Ethernet port, then you must terminate the port correctly and run TEST 1. Assuming the test passed this time, enter UNJAM at the console prompt (>>>). This command must be entered to reenable the SET and SHOW commands.

2.22 Power Supply Troubleshooting Procedures

Figure 2–31 shows the flowchart that must be followed if a problem with the power supply exists.

Figure 2–31 Flowchart for Troubleshooting the Power Supply

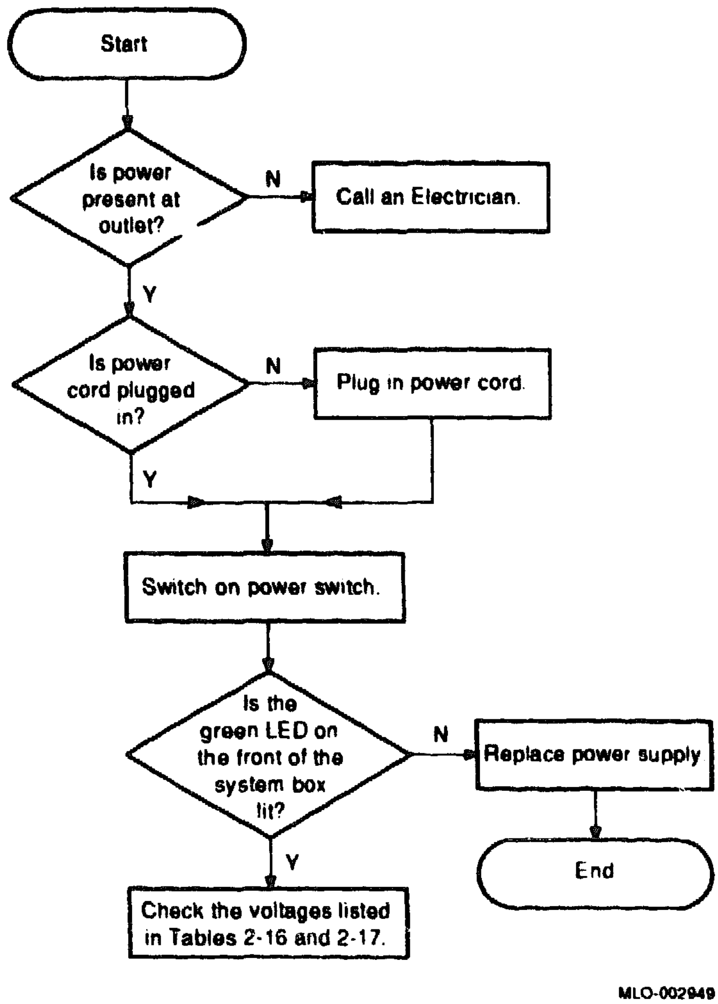


Figure 2–32 identifies the power connector pins on the system module. Table 2–16 lists the voltages on the respective pins.

Figure 2–32 Power Connector Pin Voltages on the System Module

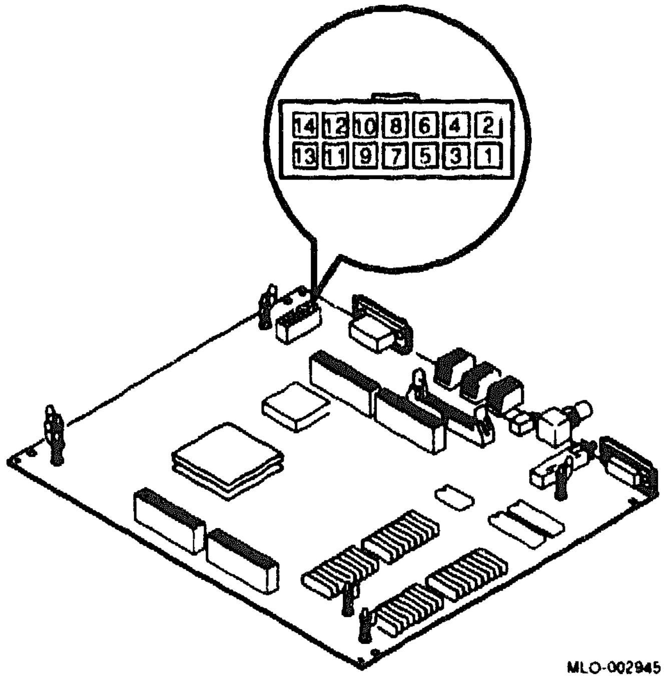


Table 2–16 System Module Power Connector Voltages

Pin Number	Voltage	Tolerance
1	- 12.1 Vdc	5%
2	Ground	—
3	Ground	—
4	Ground	—
5	+ 5.1 Vdc	5%
6	+ 5.1 Vdc	5%
7	+ 3.5 to + 5.25 Vdc	—
8	+ 5.1 Vdc	5%
9	+ 12.1 Vdc	5%
10	+ 5.1 Vdc	5%
11	Ground	—
12	Ground	—

Table 2–16 (Cont.) System Module Power Connector Voltages

Pin Number	Voltage	Tolerance
13	- 9 Vdc[1]	5%
14	- 9 Vdc return[2]	—

[1]Measurement made with negative lead connected to pin 14

[2]Ground for the - 9 Vdc supply (an isolated supply)

Figure 2–33 identifies the drive power connector pins. Table 2–17 lists the voltages on the respective pins.

Figure 2–33 Drive Power Connector Pin Voltages.

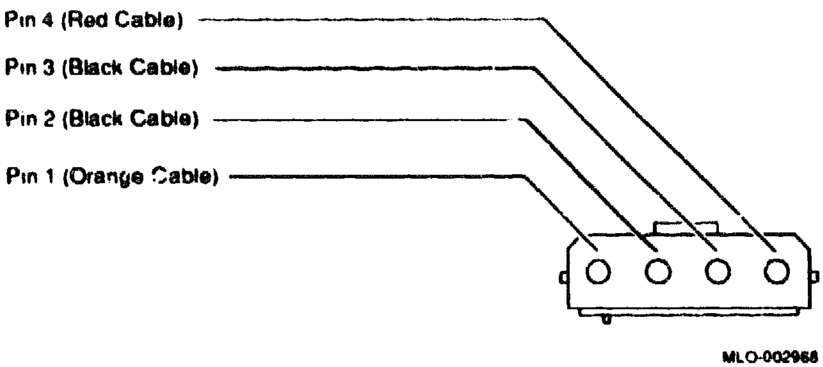


Table 2–17 Drive Power Connector Voltages

Pin Number	Voltage	Tolerance
1	+ 12.1 Vdc	5%
2	Ground	—
3	Ground	-
4	+ 5.1 Vdc	5%

3 Utilities

The utilities help the user view diagnostics, set default and restart flags, as well as other functions. Table 3–1 describes and lists the console mode TEST (T) commands that invoke the utilities.

Each utility is available on the MicroVAX 3100 and the VAXserver 3100 Model 10 and Model 20 systems.

Table 3–1 Utilities

Test Number or Command	Utility Invoked
T 50	Configuration table (also displays the Ethernet hardware address, for example, ID 08-00-2B-03-79-1F).
T 51	Set NVR default boot device.
T 52	Set NVR default boot flags.
T 53	Set NVR default recovery action flags.
T 73	Special key on tapes for Field Service mode system exerciser.
T 74	Special key on diskettes for Field Service mode system exerciser.
T 75	SCSI disk data eraser.
T 76	Mass Storage Diskette Formatter.
SHOW DEVICE	Display all devices connected to the SCSI bus controllers.
SHOW ESTAT	Show extended summaries of the system exerciser tests.

Table 3–1 (Cont.) Utilities

Test Number or Command	Utility Invoked
SHOW VER	Determine the revision level of the system module's ROM.

3.1 Configuration Table (T 50)

The configuration table lists the status/error of each device installed in the system. This configuration table holds the results of the self-test and power-up tests and is updated each time self-test is run. Figure 3–1 shows an example of a configuration table.

See Appendix E for a complete list of the power-up and self-test error codes.

NOTE

Remember that the configuration table contains the results of the self-test and power-up tests and not the results of the system exerciser.

Figure 3–1 Example of the Configuration Table

```
>>> TEST 50

KA41-A V1.3
ID 08-00-2B-02-CF-A4

 CLK         0000.0001
 NVR         0000.0001
 DZ          0000.0001
    00000001 00000001 00000001 00000001 00000000 00000000
 MEM         0004.0001
    00400000
 MM          0000.0001
 FP          0000.0001
 IT          0000.0001
 SCSI-A      7717.0001 V1.0
    FFFFFF05 FFFFFF05 FFFFFF05 00000001 FFFFFF05 FFFFFF05 FFFFFF03.
 SCSI-B      1C1C.0001 V1.0
    FFFFFF05 FFFFFF05 00000001 00000001 FFFFFF05 FFFFFF05 FFFFFF03.
 SYS         0000.0001
 DSH32-A     00FF.0001 V2.0
 DSH32-S     0000.0001 V2.0
 NI          0000.0001

>>>
```

The first line contains the CPU and the ROM version (KA41-A V1.3).

The second line contains the Ethernet hardware address (in this example it is ID 08-00-2B-02-CF-A4). The rest of the display contains the status /error codes for the devices installed on the system. The configuration table is built during power-up testing and the codes are the result of the self-test and power-up tests. This configuration table is the only place the results of self-test are indicated. It is updated every time you run self-test. Additional codes on the DZ, MEM, SCSI-A, and SCSI-B give a more detailed status on these devices and are listed in the following section.

3.1.1 DZ Explanation in Configuration Table

The DZ has six 8-digit numbers that contain the status of the four serial lines. Any 8-digit number other than 00000001 for the four serial lines indicates a failure on that line. The fifth and sixth numbers have the number 00000000 and are unused.

Figure 3–2 shows what each 8-digit number represents.

Figure 3–2 Example of the DZ Line in the Configuration Table

```
DZ        0000.0001
00000001 00000001 00000001 00000001 00000000 00000000
   ①        ②        ③        ④        ⑤        ⑥
```

① MMJ port 1 (DEC423)

② MMJ port 2 (DEC423)

③ Modem (RS232 Serial line port)

④ MMJ port 3 (DEC423)

⑤ Unused

⑥ Unused

3.1.2 MEM Explanation in Configuration Table

The Configuration display provides additional information about the memory in the system. Figure 3–3 shows an example of the MEM information in the configuration display.

Figure 3–3 Configuration Display MEM Information

```
MEM          0004.0020  ①
   00400000 00000003

       ②        ③
```

① The first four digits indicate the amount of memory available if no errors are detected. The second four digits contain a status code for the memory.

② This code repeats the amount of memory in the system. Table 3–2 explains the codes.

③ This code contains the location of the failed memory. It is displayed only if an error is detected.

Table 3–2 Hexadecimal Memory Codes

Codes	Mb of Memory
00400000	4Mb
00800000	8Mb
01000000	16Mb
01400000	20Mb
01800000	24Mb
01C00000	28Mb
02000000	32Mb

If the 8-digit error code, ③, appears, there is an error in one or more of the memory modules. A code other than 0 in any of the digits indicates a faulty module. The module indicated by that digit depends on the configuration as shown in Table 3–3.

Table 3–3 Locating a Failed Memory Bank

	8-Digit Error Code for MEM							
Installed Memory	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
System module	0	0	0	0	0	0	0	S
4Mb module	0	0	0	0	0	0	4	S
12Mb module	0	0	0	0	12	12	12	S
16Mb module	0	0	0	16	16	16	16	S
4Mb and 16Mb modules	0	0	16	16	16	16	4	S
12Mb and 16Mb modules	16	16	16	16	12	12	12	S

S—Represents the system module
4—Represents the 4Mb memory module
12—Represents the 12Mb memory module
16—Represents the 16Mb memory module

Figure 3–4 shows a typical error code for MEM in the configuration display.

Figure 3–4 Configuration Display MEM Error Code Example 1

```
MEM          0020.0020
    02000000 10002000
```

In this example, digits 1 and 5 of the error code are not zero. The system has 32Mb of memory, therefore the 12Mb and 16Mb memory modules are installed. Table 3–3 indicates that when the 12Mb and 16Mb modules are installed, digits 1 and 5 indicate errors on the 16Mb module and the 12Mb module respectively.

Figure 3–5 shows another MEM error code example.

Figure 3–5 Configuration Display MEM Error Code Example 2

```
MEM          0020.0020
   01000000 00003003
```

In this example, digits 5 and 8 of the error code are not zero. The system has 16Mb of memory, therefore the 12Mb memory module is installed. Table 3–3 indicates that when only the 12Mb module is installed, digits 5 and 8 indicate errors on the 12Mb module and the system module respectively.

A code other than zero in digit 8 always indicates an error in the system module memory.

See Appendix E for a complete list of the power-up and self-test error codes. See Appendix F for a complete list of the system exerciser error codes.

3.1.3 SCSI Bus Explanation (SCSI-A and SCSI-B) in the Configuration Table

The SCSI bus device displays eight 8-digit numbers. See Figure 3–6. Each of the 8-digit numbers contain the status of a device at a particular SCSI address on the SCSI bus. To determine what a drive's code indicates, see the troubleshooting section for that drive.

Figure 3–6 shows the address ID locations for the six possible drives on an SCSI bus.

Figure 3–6 SCSI Bus Lines in the Configuration Table

```
SCSI-A      7711.0001  V1.0
FFFFFF05 FFFFFF05 FFFFFF05 00000001 FFFFFF05 00000001 FFFFFF03 FFFFFF05

SCSI-B      1C1C.0001  V1.0
FFFFFF05 FFFFFF05 00000001 00000001 FFFFFF05 FFFFFF05 FFFFFF03 FFFFFF05
```

- SCSI address ID 0
- SCSI address ID 1
- SCSI address ID 2
- SCSI address ID 3
- SCSI address ID 4
- SCSI address ID 5
- SCSI address ID 6
- SCSI address ID 7

3.1.3.1 SCSI Address ID Assignments

Each device on the SCSI bus, including the SCSI bus controller, has its own address ID location. The SCSI bus controller always holds the address ID of 6 for all buses. Refer to Table 3–4 to determine the default address ID assignments for both SCSI buses.

Table 3–4 MicroVAX 3100 Family SCSI Bus ID Assignments

IDs	SCSI-A Bus	IDs	SCSI-B Bus
7	Unused	7	Reserved for expansion
6	SCSI-A bus controller	6	SCSI-B bus controller
5	TZ30, RX23, RZ23	5	TK50Z expansion box
4	Unused	4	RRD40 expansion box
3	RZ23 (system disk)	3	RZ23
2	Unused	2	RZ23
1	Unused	1	RZ55 expansion box
0	Unused	0	RZ23 or RX23

NOTE

Model 10 systems do not contain as many internal storage devices as Model 20 systems; however, both systems use the same SCSI ID assignments, as listed in Table 3–4. InfoServer 100 systems have different SCSI A bus assignments. The system disk, RZ23E or RZ23L, MUST be ID 1 and the internal RRD40 or RRD42 compact disk drive on SCSI-A bus MUST be ID 2. InfoServer 100 systems do not support the TZ30 or the RX23.

3.1.4 DSH32-A Explanation in the Configuration Table

Figure 3–7 shows an example of the DSH32-A information in the configuration display.

Figure 3–7 Configuration Display DSH32-A Information

```
DSH32-A    00FF.0001 V2.0
   1         2    3    4
```

1. The device identifier, in this case, the DSH32-A subsystem.
2. A bitmap, in hexadecimal, that indicates which of the asynchronous lines are working. See Figure 3–8.
3. A device error code.

- The revision level of the device.

Figure 3–8 Error Code Format for the DSH32-A Subsystem

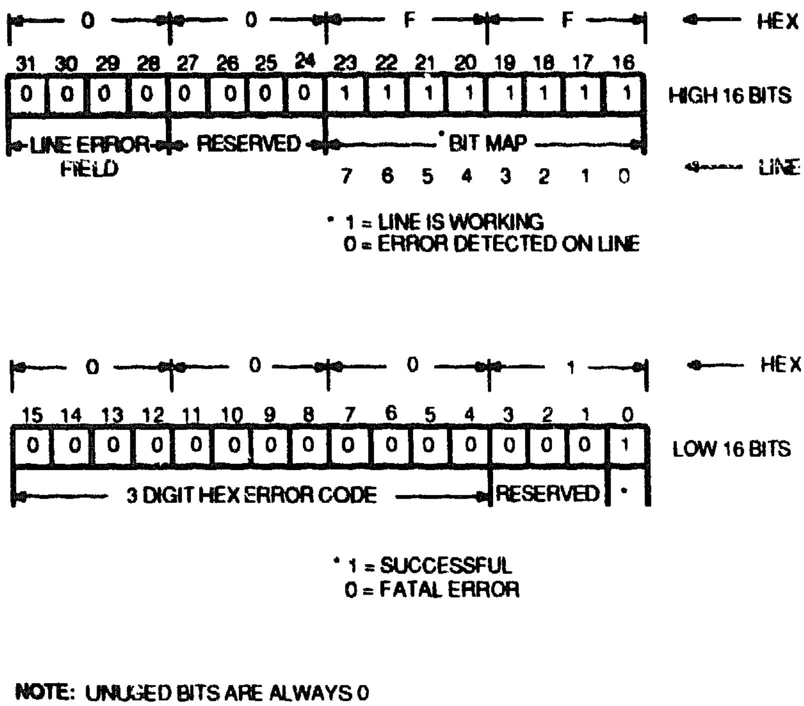


Figure 3–9 shows a typical error code for DSH32-A in the configuration display.

Figure 3–9 Configuration Display DSH32-A Error Code Example 2

```
DSH32-A    00B7.00A0 V2.0
```

To determine which asynchronous lines are working, convert B7 into binary format, giving 10110111. This indicates that asynchronous lines 7, 5, 4, 2, 1, and 0 are operating normally, while lines 6 and 3 are faulty, as shown in Figure 3–8.

3.2 Setting NVR Default Boot Device (T 51)

Enter TEST 51 (a utility) or SET BOOT (a command) to set the boot device. Both methods set the default boot device in the NVR.

Figure 3–10 shows an example of changing the default boot device from four periods .... (no default device stored in the NVR), which indicates that ESA0 would be the boot device, to the system disk, DKA300 (an RZ23 in the system box).

Figure 3–10 Example of Changing the Default Boot Device

```
>>> TEST 51
    .... ? >>> DKA300

>>>
```

OR

```
>>> SET BOOT DKA300
>>>
```

Press RETURN to exit TEST 51 without changing the default boot device. Enter a period (.) to clear the default boot device from NVR. Enter the device, such as DKA300, to set the default boot device to that device.

There are several boot device names to choose from. Table 3–5 lists the boot device names and the devices they represent.

Table 3–5 Boot Device Names

Boot Device	Device Type	Explanation
DKAx00	Hard disk	RZ23 on SCSI-A bus at address ID x.
DKBx00	Hard disk	RZ23, or RZ55 on SCSI-B bus at address ID x.
MKAx00	Tape drive	TZ30 on SCSI-A bus at address ID x.
MKBx00	Tape drive	TK50Z on SCSI-B bus at address ID x.
DUAx	Diskette drive	RX23 on SCSI-A bus at address ID x
ESA0	Ethernet network	System boots off another node.

3.3 Setting NVR Default Boot Flags (T 52)

Enter TEST 52 (a utility) or SET BFLG (a command) to set the boot flags. Both methods set the default boot flags in the NVR. Table 3–6 lists the boot flags that the ULTRIX operating system uses. Table 3–7 lists the boot flags that the VMS operating system uses. Figure 3–11 shows an example of changing the default boot flag from 00000000 to 00000010 (diagnostic boot). Press RETURN to exit TEST 52 without changing the default boot flag.

Figure 3–11 Example of Changing the Default Boot Flag

```
>>> TEST 52
    00000000 ? >>> 00000010

>>>
```

OR

```
>>> SET BFLG 00000010
>>>
```

It is possible to specify one or any combination of boot flags in the NVR. Enter the sum value (in hexadecimal) of the flags that you want loaded into the NVR. For example, to specify the RPB$V_DIAG flag, RPB$V_HALT flag, and the RPB$V_MPM flag, add all three flags, and enter the sum into NVR. Figure 3–12 shows this example.

Figure 3–12 Determining the NVR Code for Three Boot Flags

```
RPB$V_DIAG   ---  00000010
RPB$V_HALT   ---  00000200
RPB$V_MPM    ---  00000800
                  --------
Enter this code   00000A10
```

Table 3–6 Boot Flags Used by ULTRIX

Flag	Definition
00000001	RPB$V_CONV — Conversational boot. This will force ULTRIXBOOT to prompt the user for an image name. This allows the user to specify an image name that is different from the default 'vmunix'. If the DIAG is also on, then the user is prompted for the diagnostic supervisor image name.
00000002	RPB$V_DEBUG — If this flag is set, the ULTRIX kernal image is booted to single-user mode.
00000004	RPB$V_INIBPT — Initial breakpoint. If RPB$V_DEBUG is set, ULTRIX executes a BPT instruction immediately after enabling mapping.
00000008	RPB$V_BBLOCK — Secondary boot from boot block. Secondary bootstrap is a single 512 byte block, whose LBN is specified in R4. R4 must be 0 for ULTRIX.
00000010	RPB$V_DIAG — Diagnostic boot. This causes ULTRIXBOOT to load the appropriate diagnostic supervisor by CPU type. The default path is /field/e?saa.exe, where the partition is specified in bits 31:28 of this register.
00000020	RPB$V_BOOBPT — Bootstrap breakpoint. Stops the primary and secondary bootstraps with a breakpoint instruction before testing memory.
00000040	RPB$V_HEADER — Image header. Takes the transfer address of the secondary bootstrap image from that file's image header. If RPB$V_HEADER is not set, transfers control to the first byte of the secondary boot file.
00000080	RPB$V_NOTEST — Memory test inhibit. Sets a bit in the PFN bit map for each page of memory present. Does not test the memory.

Table 3–6 (Cont.) Boot Flags Used by ULTRIX

Flag	Definition
00000100	RPB$V_SOLICT — File name. Prompt for the name of a secondary bootstrap file.
00000200	RPB$V_HALT — Halt before transfer. Executes a halt instruction before transferring control to the secondary bootstrap.
00000400	RPB$V_NOPFND — No PFN deletion (not implemented; intended to tell VMB not to read a file from the boot device that identifies bad or reserved memory pages, so that VMB does not mark these pages as valid in the PFN bitmap).
00000800	RPB$V_MPM — Specifies that multiport memory is to be used for the total exec memory requirement. No local memory is to be used. This is for tightly-coupled multiprocessing.
00001000	RPB$V_USEMPM — Specifies that multiport memory should be used in addition to local memory, as though both were one single pool of pages.
00002000	RPB$V_MEMTEST — Specifies that a more extensive algorithm be used when testing main memory for hardware nonrecoverable (RDS) errors.
00004000	RPB$V_FINDMEM — Requests use of MA780 memory if MS780 is insufficient for booting. Used for 11/782 installations.
00008000	RPB$V_AUTOTEST — Used by diagnostic supervisor.
00010000	RPB$V_CRDTEST — Request pages with CRD errors are not to be removed from bitmap.
X0000000	RPB$V_TOPSYS — Redefines the default load file system partition. This field is used primarily with DIAG. The following corresponding partition numbers and letters are: 0 = a 1 = b 2 = c 3 = d 4 = e 5 = f 6 = g 7 = h

Table 3–7 Boot Flags Used by VMS

Flag	Definition
00000001	RPB$V_CONV — Conversational boot. At various points in the system boot procedure, the bootstrap code solicits parameters and other input from the console terminal. If the DIAG is also on, the diagnostic supervisor then enters MENU mode and prompts the user for devices to test.
00000002	RPB$V_DEBUG — Debug. If this flag is set, VMS maps the code for the XDELTA debugger into the system page tables of the running system.
00000004	RPB$V_INIBPT — Initial breakpoint. If RPB$V_DEBUG is set, VMS executes a BPT instruction immediately after enabling mapping.
00000008	RPB$V_BBLOCK — This skips the files-11 boot and performs only the boot block type boot.
00000010	RPB$V_DIAG — Diagnostic boot. Secondary bootstrap is image called [SYSMAINT]DIAGBOOT.EXE.
00000020	RPB$V_BOOBPT — Bootstrap breakpoint. Stops the primary and secondary bootstraps with a breakpoint instruction before testing memory.
00000040	RPB$V_HEADER — Image header. Takes the transfer address of the secondary bootstrap image from that file's image header. If RPB$V_HEADER is not set, transfers control to the first byte of the secondary boot file.
00000080	RPB$V_NOTEST — Memory test inhibit. Sets a bit in the PFN bit map for each page of memory present. Does not test the memory.
00000100	RPB$V_SOLICT — File name. Prompt for the name of a secondary bootstrap file.
00000200	RPB$V_HALT — Halt before transfer. Executes a halt instruction before transferring control to the secondary bootstrap.
00000400	RPB$V_NOPFND — No PFN deletion (not implemented; intended to tell VMB not to read a file from the boot device that identifies bad or reserved memory pages, so that VMB does not mark these pages as valid in the PFN bitmap).

Table 3–7 (Cont.) Boot Flags Used by VMS

Flag	Definition
00000800	RPB$V_MPM — Specifies that multiport memory is to be used for the total exec memory requirement. No local memory is to be used. This is for tightly-coupled multiprocessing. If the DIAG is also on, then the diagnostic supervisor enters AUTOTEST mode.
00001000	RPB$V_PFILE — (overlays RPB$V_USEMPM) File name. Prompt for the name of the parameters file on a network bootstrap operation.
00002000	RPB$V_MEMTEST — Specifies that a more extensive algorithm be used when testing main memory for hardware nonrecoverable (RDS) errors.
00004000	RPB$V_FINDMEM — Requests use of MA780 memory if MS780 is insufficient for booting. Used for 11/782 installations.
00008000	RPB$V_AUTOTEST — Used by diagnostic supervisor.
00010000	RPB$V_CRDTEST — Request pages with CRD errors to be removed from bitmap.
X0000000	RPB$V_TOPSYS — The X position specifies the top level directory number for system disks with multiple systems.

3.4 Setting the NVR Default Recovery Action Flags (T 53)

Enter TEST 53 (a utility) or SET HALT (a command) to set the recovery action flag. Both methods set the default recovery action in the NVR. The default recovery action flag is used by the system during power up and also if the system detects a severe error in its operating environment. There are three flags to choose from: restart, boot, or halt.

- Restart searches for the restart parameter block (RPB) in memory (the RPB contains addresses of certain registers that hold restart information).
- Boot starts booting the operating system software.
- Halt automatically halts the system and enters console mode.

Table 3–8 lists the recovery flags available.

Table 3–8 Default Recovery Flags

Number	Recovery Action Flag
1	Restart
2	Boot
3	Halt

Figure 3–13 shows an example of changing the flag from 2 (boot) to 3 (halt). Press RETURN to exit TEST 53 without changing the flag.

Figure 3–13 Example of Changing the NVR Recovery Action Flags

```
>>> TEST 53
    2 ? >>> 3

>>>
```

OR

```
>>> SET HALT 3
>>>
```

3.5 Tape Cartridge Special Diagnostic Key for Field Service System Exerciser (T 73)

The tape cartridge in the maintenance kit must have a special diagnostic code written on it that allows the system exerciser to write on this media when running in Field Service mode. Normal customer media does not have the diagnostic key and the system exerciser does not perform write testing on the removable media devices. This safety feature protects the customer's programmed tapes.

TEST 73 is the utility that creates the special key on the tape. The tape in the maintenance kit must be initialized with these special diagnostic keys before they can be used. It must be initialized every time you use it with the Field Service mode system exerciser, because the special diagnostic key on the tape is destroyed once the exerciser recognizes the key.

Figure 3–14 shows an example of successfully creating a special-key tape cartridge. If any errors occur while running TEST 73, make sure the drive is on-line and operating correctly and run the special-key command again. Also, make sure the tape is not write-protected.

Figure 3–14 Example of Creating the Special Key on a Tape Cartridge

```
>>> TEST 73

                        KA41-A TPmker
 VStmk_QUE_port (A,B) ? A                        1
 VStmk_QUE_id (0,1,2,3,4,5,6,7) ? 5              2
 VStmk_QUE_RUsure (1/0) ? 1                      3
 VStmk ........... OK                            4
>>>
```

1. Enter port address.
2. Enter ID address of drive.
3. Enter 1 for yes, 0 for no.
4. Keyed successfully.

3.6 Diskette Special Diagnostic Key for Field Service System Exerciser (T 74)

The diskette in the maintenance kit must have a special diagnostic code written on it that allows the system exerciser to write on this media when running in Field Service mode. Without this special key, such as on normal customer media, the system exerciser does not do write testing on the removable media devices. This safety feature prevents accidentally destroying the customers programmed diskettes.

T 74 is the utility that creates the special key on the diskette. The diskette in the maintenance kit must be initialized with these special diagnostic keys before they can be used. The special diagnostic key is not destroyed when the diskette is used.

Figure 3–15 Example of Creating the Special Key on a Diskette

```
>>> T 74

                    KA41 FLmker
 VSflmk_QUE_port (A,B) ? A                        1
 VSflmk_QUE_id (0,1,2,3,4,5,6,7) ? 5              2
 VSflmk_que_rusure (1/0) ? 1                      3
 VSflmk...........OK                              4
>>>
```

1. Enter port A or B.
2. Enter ID of the drive.
3. Enter 1 for yes, 0 for no.
4. Keyed successfully.

Figure 3–15 shows an example of successfully creating a special-key diskette. If any errors occur while running T 74, make sure the drive is on-line and operating correctly and run the special-key command again. Also, make sure the diskette is not write-protected.

3.7 SCSI Mass Storage Disk Data Eraser (T 75)

This utility erases the data on a drive on one of the SCSI buses. Enter T 75 to start the data eraser. Figure 3–16 shows an example of running the data eraser on the drive located at SCSI address ID 1 on the SCSI-B bus.

CAUTION

This utility destroys all user data on the drive.

Figure 3–16 Example of Erasing Data on an RZ55

```
>>> T 75

        ScsHDerase
 PV_SCS_FMT_CHN (0=SCSIA \ 1=SCSIB)?  0
 PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)?  1
 PV_SCS_FMT_RUsure (1\0)?  1

 PV_SCS_FMTing...........
 PV_SCS_FMT_BBrepl = 0
 PV_SCS_FMT_SUCC

>>>
```

Figure 3–17 shows an example of an error while running the data eraser on the drive located at SCSI address 3 on the SCSI-A bus.

Figure 3–17 Example of an Error While Erasing an RZ55

```
>>> T 75

        ScsHDerase
 PV_SCS_FMT_CHN
 PV_SCS_FMT_CHN (0=SCSIA \ 1=SCSIB)?  0
 PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)?  3
 PV_SCS_FMT_RUsure (1/0)?  1

 PV_SCS_FMTing...........?

 PV_SCS_FMT_ERR#3

>>>
```

3.7.1 SCSI Disk Eraser Messages

All messages for the data eraser start with PV_SCS_FMT. The second segment of the message indicates what type of information the utility is looking for: CHN for which SCSI bus the drive is on, ID (0,1,2,3,4,5,6,7)? for the SCSI address ID of the drive, and RUsure (1/0)? for one last verification that you do want to erase this drive. Table 3–9 lists all the data erasure messages and gives an explanation for each. Table 3–10 lists the error codes for the disk data eraser utility.

Table 3–9 SCSI Data Eraser Messages

Formatter Message	The Program is ...
PV_SCS_FMT_CHN (0=SCSIA \ 1=SCSIB)?	Asking which SCSI bus the drive is located on.
PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)?	Asking for the SCSI address ID of the drive.
PV_SCS_FMT_RUsure (1\0)?	Asking, "Are you sure?" as a safety check. If you want to erase the drive, enter 1; otherwise, enter 0 or any other character to abort the process.
PV_SCS_FMTing	Erasing the drive.
PV_SCS_FMT_ERR#	Stopping the eraser because of the error code indicated by the #. Table 3–10 lists the error codes.

Table 3–10 T 75 Error Codes for the SCSI Data Eraser

Code	Description
1	Illegal unit number entered.
2	Error occurred during an SCSI bus command.
3	Reassign blocks failed (no more replacement blocks available).
4	Unit not ready.
5	Illegal device type for operation.

3.8 Mass Storage Diskette Formatter (T 76)

This utility formats RX23 diskettes. The command to start the formatter is T 76. Figure 3–18 shows an example of running the formatter on DUA2 (RX23).

CAUTION

Formatting destroys all user data on the diskette.

Figure 3–18 Example of Formatting an RX23 Diskette

```
>>> T 76

                          ScsFLpFmtter

 PV_SCS_FMT_CHN (0=SCSIA \ 1=SCSIB) ? 2          ①

 PC_SCS_FMT_ID (0,1,2,3,4,5,6,7) ? 1             ②
 PV_SCS_FMT_RUsure (1\0) ? 1                     ③
 PV_SCS_FMTing ..... OK                          ④
 PV_SCS_CKRXFMT ..... OK                         ⑤
 PV_SCS_RES_Succ                                 ⑥
>>>
```

① Enter SCSI bus.

② Enter drive number.

③ Enter 1 for yes, 0 for no.

④ Diskette formatted OK.

⑤ Diskette checked OK.

⑥ Diskette is formatted successfully.

3.8.1 Diskette Formatter Messages

All messages for the formatter start with PV_SCS_. The second segment of the message indicates the type of message. Table 3–11 lists all the formatter messages and gives an explanation for each.

Table 3–11 Diskette Formatter Messages

Formatter Message	Explanation
PV_SCS_CkRXfmt	The RX23 diskette format is being checked.
PV_SCS_FMTING	The RX23 diskette is being formatted.
PV_SCS_FMT_RUSURE (1/0) ?	The formatter uses this question as a safety check. If you want to format the diskette that is indicated by the #, enter 1 for yes. Otherwise, enter any character other than 1 to abort the formatter.
PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)	Enter the drive that needs formatting. Enter 2 for DUA2 (a 0 is for DUA0, 1 is for DUA1, and 3 is for DUA3). Any character other than listed aborts the formatter.
PV_SCS_RES_Succ	The diskette has been successfully formatted.
PV_SCS_RES_Abtd	The RX23 formatter has been aborted.
PV_SCS_FMT_ERR #	The formatter has been stopped because of the error code indicated by the #. Table 3–12 lists the error codes.

Table 3–12 T 76 Error Codes for the Diskette Formatter

Code	Description
1	Illegal unit number entered.
3	Error occurred during formatting.
5	Error occurred during the diskette check pass.
6	No diskette is loaded in the diskette drive, or the diskette is not an RX23 media.

3.9 Determining SCSI Address IDs for Drives in the System (SHOW DEVICE)

Enter SHOW DEVICE at the console prompt (>>>) to check the SCSI address ID for a particular device or to determine whether the device is on the SCSI-A or SCSI-B bus. The SHOW DEVICE command displays all devices connected to the SCSI bus controllers. This display lists the SCSI address ID of all devices on SCSI buses. Figure 3–19 shows an example of this command.

Figure 3–19 Example of the SHOW DEVICE Command

```
>>> SHOW DEVICE
VMS/VMB   ULTRIX   ADDR      DEVTYP   NUMBYTES   RM/FX   WP   DEVNAM
-------   ------   ----      ------   --------   -----   --   ------
ESA0      SE0    08-00-2B-03-79-1F ❶

DKA300    RZ3    A/3/0/00    DISK     104   MB   FX          RZ23
MKA500    TZ5    A/5/0/00    TAPE     ........    RM
...HostID....    A/6         INITR ❷

DKB200    RZ10   B/2/0/00    DISK     104    MB   FX          RZ23
DKB300    RZ11   B/3/0/00    DISK     104    MB   FX          RZ23
DKB400    RZ12   B/4/0/00    RODISK   935    MB   RM     WP   RRD40
...HostID....    B/6         INITR
  ❸        ❹        ❺          ❻           ❼       ❽      ❾     ❿
>>>
```

❶ ESA0 — the Ethernet device and the Ethernet address of the system.

❷ ...HostID... — the SCSI bus controller.

❸ Device numbers for VAX/VMS operating systems.

❹ Device numbers for ULTRIX operating systems.

❺ Address.

❻ Device type.

❼ Number of megabytes.

❽ Removable or fixed disk.

❾ Write protected.

❿ Device name.

If the system does not contain a full configuration of drives internally, additional expansion boxes can be connected to the SCSI-B port using one of the unused SCSI address ID locations. See Section 2.12.4 for further information on how to set the proper SCSI address IDs for all devices.

3.10 Extended Summaries for the System Exerciser (SHOW ESTAT)

Extended summaries are available only when running the system exerciser in Field Service mode.

- When running TEST 101, extended summaries are available when the testing automatically stops after the second pass.
- When running TEST 102, extended summaries are available when you halt the tests by pressing CTRL/C after the second pass of the test is complete.
- When running TEST 80000106, extended summaries are not available. To display the results of the tests once again press the halt button after the second pass of the test is complete and enter SHOW ESTAT at the console prompt (>>>).

Extended summaries contain additional error information on some of the devices run by the exerciser. Press RETURN to display the first extended summary. Continue pressing a RETURN to display all of the extended summaries until you return to the exerciser display. Press a second CTRL/C to halt the extended summaries and return to the console prompt (>>>). Press a RETURN to stop the extended summary for the SHOW ESTAT command. The halt message is displayed when the exerciser is stopped and control is returned to the console.

To display the extended summaries once again after exiting the system exerciser, enter SHOW ESTAT. This command brings up extended summary information from the last time the Field Service system exerciser ran.

Figure 3–20 shows an example of the extended summary for the SCSI-A device and then an example for the SCSI-B device.

Figure 3–20 Example of SCSI-B Extended Summary Report

```
KA41-A   V1.3            01            FS
******** SCSI-A               STM_SUMM            0 00:05:57 ******

     adr         rds       wts       xfs       xferr      sde
     ---       -------   -------   -------   -------      ---

     003         008       000       157       000         1

********* STM_TYPE_ANYTHING
>>> Return
******** SCSI-B               STM_SUMM            0 00:05:57 ******

     adr         rds       wts       xfs       xferr      sde
     ---       -------   -------   -------   -------      ---

     004         008       000       073       000         1
     005         008       004       023       000         1
      1           2         3         4         5

********* STM_TYPE_ANYTHING
```

1. The SCSI address ID of a drive.
2. The number of reads performed on that drive.
3. The number of writes performed on that drive.
4. The number of data transfers performed on that drive.
5. The number of transfer errors on that drive.

3.11 Determining the Revision Levels in the System Module's ROM (SHOW VER)

The ROMs on the system module contain four separate sections of program code. These sections are the self-test code (PST), console code (CON), VMB code, and the ROM code; all have different internal revision levels. Enter SHOW VER to see the internal revision levels of the self-test, console, VMB, and ROM code displayed next to KA41-A. Figure 3–21 shows an example of these revision levels. The 16D is for the self-test revision level, 1BC is the console code revision level, V4.6 is for the VMB revision level, and 24B is the ROM code revision level.

Figure 3–21 Example of the System Module's ROM Code Revision Levels

```
>>> SHOW VER

 KA41-A V1.3BC-16D-V4.6-24B
        PST: 16D
        CON: 1BC
        VMB: V4.6
        ROM: 24B

>>>
```

4
The Model 10 System

4.1 Enclosure Description

The MicroVAX 3100 and VAXserver 3100 Model 10 systems are similar in appearance. To identify which system you are working on, look at the nameplate on the front of the system box.

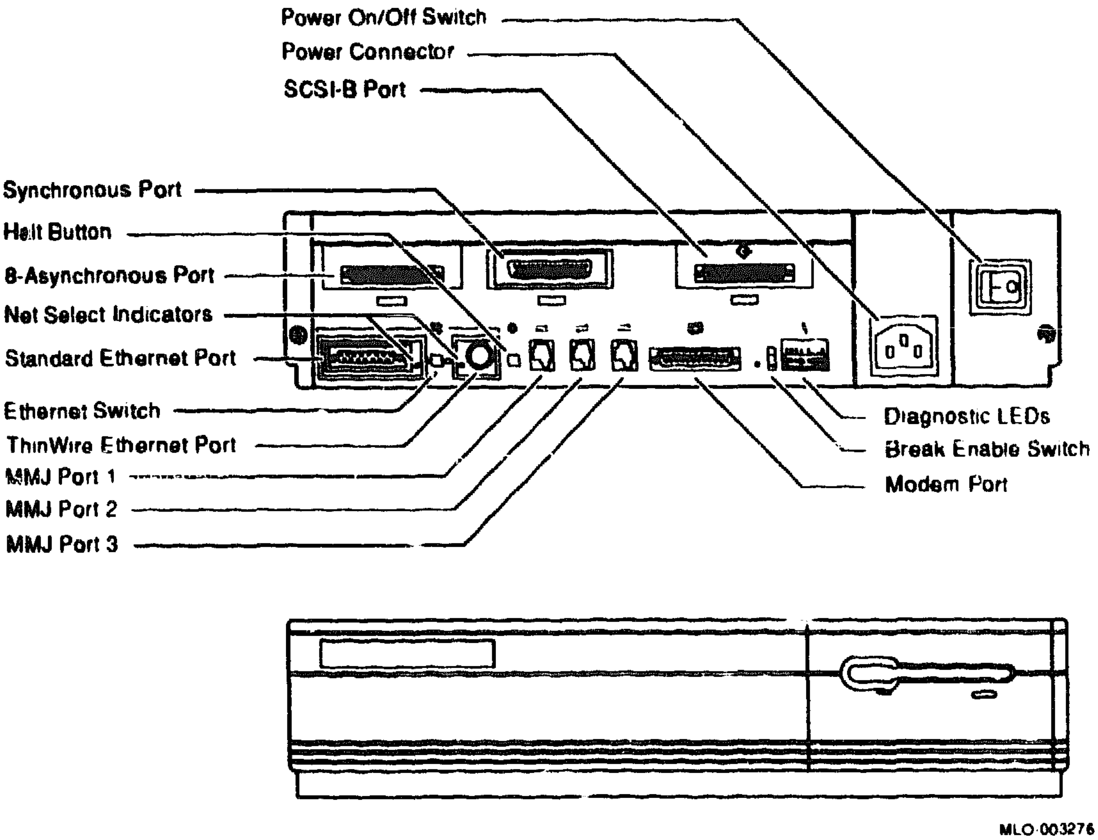
The system box contains up to 11 Field Replaceable Units (FRUs):

- System module.
- Memory module.
- Second memory daughter board.
- DSH32-B communications module.
- Floppy diskette interface (FDI) board.
- Power supply.
- Distribution board.
- Battery pack.
- Up to three internal mass storage devices (TZ30 tape drive, RX23 diskette drive, and RZ23 disk drives).

There are also three expansion boxes available that contain additional mass storage devices (TK50Z expansion box, RZ55 disk drive expansion box, and an RRD40 compact disc expansion box).

Figure 4–1 shows the front and rear panels of the system.

Figure 4–1 The System Box



You can connect VTxxx terminals to a MicroVAX 3100 or VAXserver 3100 Model 10 system through MMJ ports 1, 2, and 3. A fourth Vtxxx terminal can be connected if an adapter (H8571-A) is fitted to the modem port (RS232). To connect more terminals, your system must have a DSH32-B communications module with a cable concentrator connected to the eight-asynchronous port. The cable concentrator provides an additional eight MMJ ports. Alternatively, you can connect printers or modems to these MMJ ports if you wish.

Connection to the Ethernet is done through either the ThinWire Ethernet port or the standard Ethernet port depending on which type of Ethernet network is available. The position of the Ethernet switch determines which of the Ethernet ports provides IEEE 802.3 network communications. An LED is lit beside the enabled port.

The external SCSI port is used to connect external mass storage devices to the system.

The position of the BREAK ENABLE switch at powerup determines the function of MMJ port 3. If the switch is in the down position at powerup, the port functions as a normal communications port. If the switch is in the up position, the port functions as an alternative console port to which you can connect a VTxxx terminal. When the VTxxx terminal connected to the MMJ port 3 is enabled, you can press the BREAK key on the keyboard to enter console mode directly.

4.2 FRU Removal and Replacement

This section describes the removal and replacement procedures for the FRUs in MicroVAX 3100 or VAXserver 3100 Model 10 systems. Refer to Table 4–1 to find the name of the FRU that needs replacing. Then go to the section listed opposite the FRU entry. Follow the steps in the section to remove the FRU and reverse the procedures to replace the FRU. Always test the replaced device for proper operation.

CAUTION

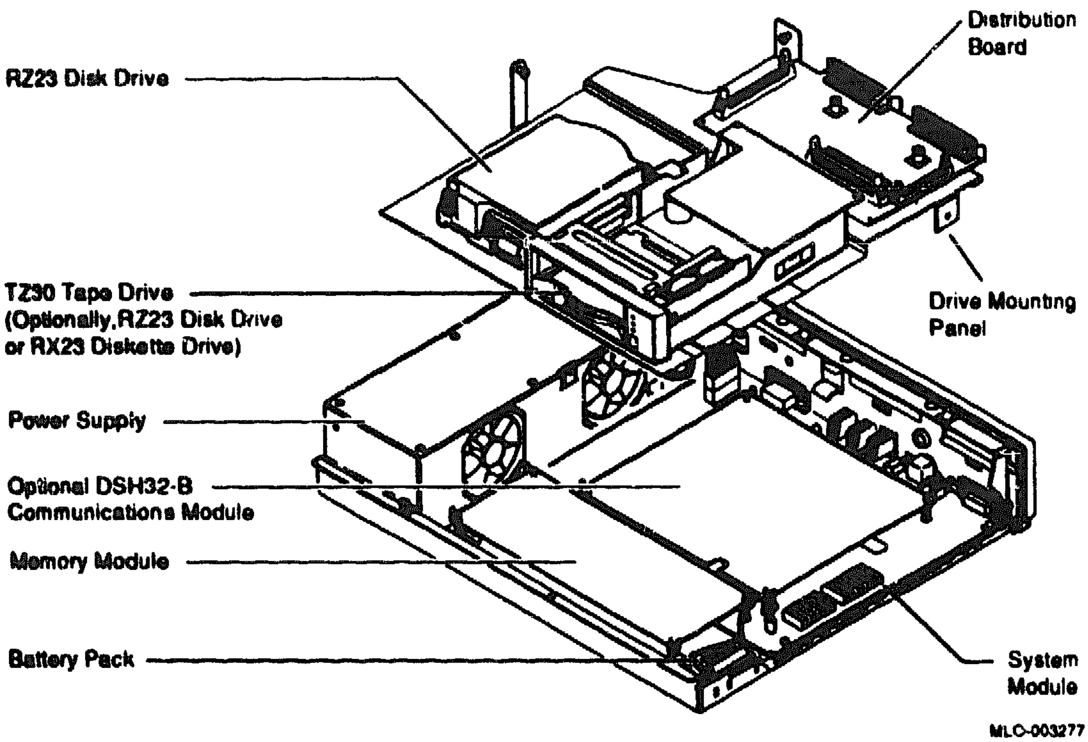
Wear a static wrist strap and use a static mat when replacing FRUs.

Table 4–1 FRU Section Listings

FRU	Section
Distribution board	4.2.3
RZ23 disk drive	4.2.4
TZ30 tape drive	4.2.5
RX23 diskette drive and FDI board	4.2.6
DSH32-B communications module	4.2.7
Memory modules	4.2.8
System module	4.2.9
Battery pack	4.2.10
Power supply	4.2.11

Figure 4–2 shows the locations of the FRUs.

Figure 4–2 FRU Locations

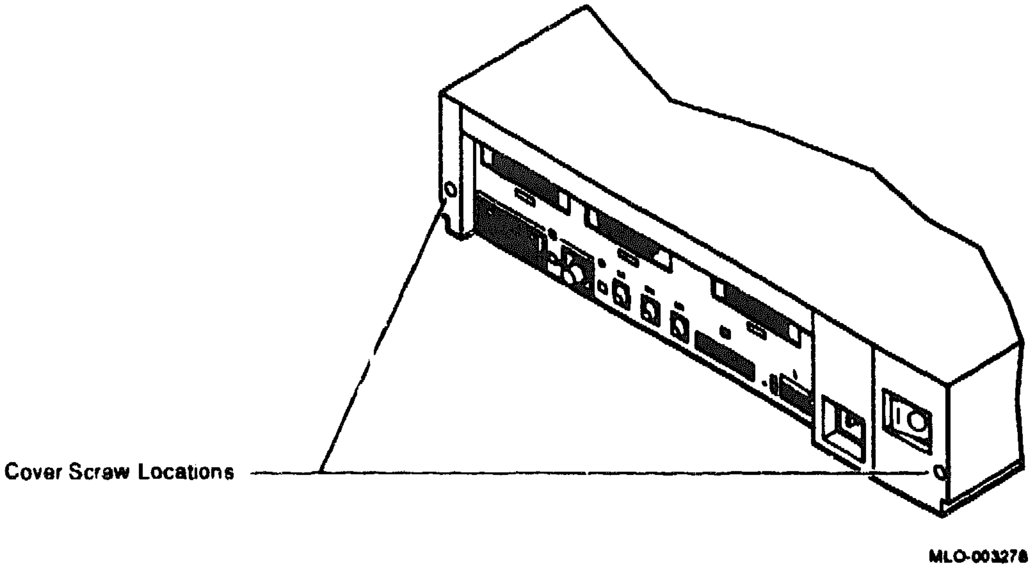


4.2.1 System Box Cover Removal

Remove the system box as follows:

1. Turn the system power switch off.
2. Disconnect all the cables connected to the system unit.
3. Loosen the two cover screws on the rear panel of the system box. See Figure 4–3.
4. Slide the cover forward and up off the system box.

Figure 4–3 Cover Screw Locations



4.2.2 Drive Mounting Panel Removal

The drive mounting panel contains storage devices in one of the combinations shown in Figure 4–4, depending on the configuration. Remove the drive mounting panel as follows:

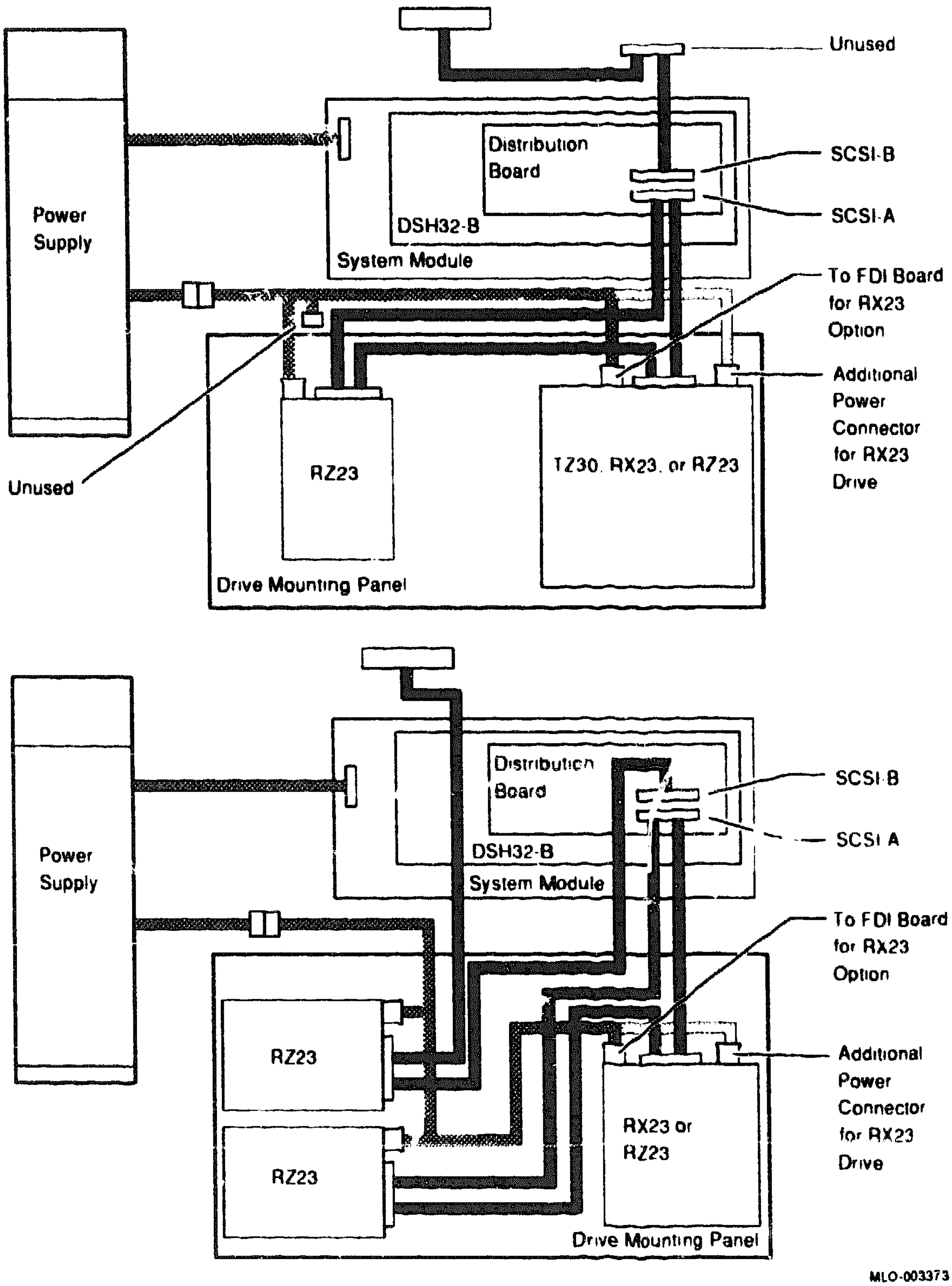
1. Remove the system box cover. See Section 4.2.1.

CAUTION

You must note which cables connect to which drives when disconnecting them. Write the type of drive and its position on a piece of tape and wrap the tape around the connector before disconnecting it. This will help you when reinstalling the drives.

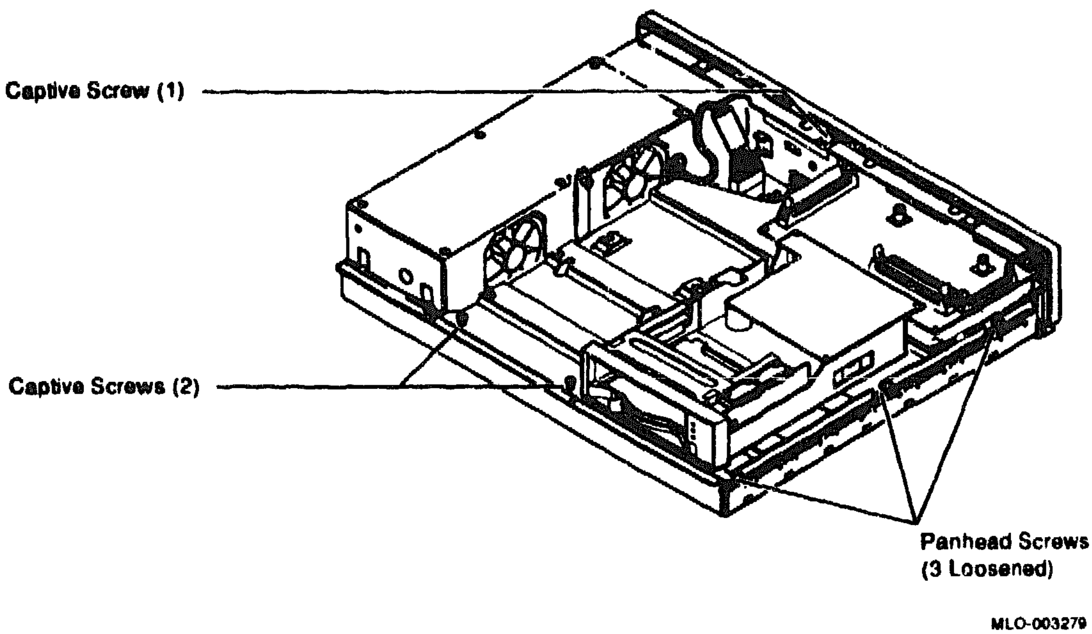
2. Disconnect the SCSI and power cables connected to the drives on the drive mounting panel. See Figure 4–4.
3. Disconnect the cables connecting the distribution board to the system module and DSH32-B communications module (if installed). See Figure 4–4.

Figure 4–4 Storage Device Positioning and Cabling



4. Unscrew the seven screws. See Figure 4–5.
5. Slide the panel forward (with the devices attached) then lift the panel from the system box and gently set it aside.

Figure 4–5 Unscrewing the Drive Mounting Panel



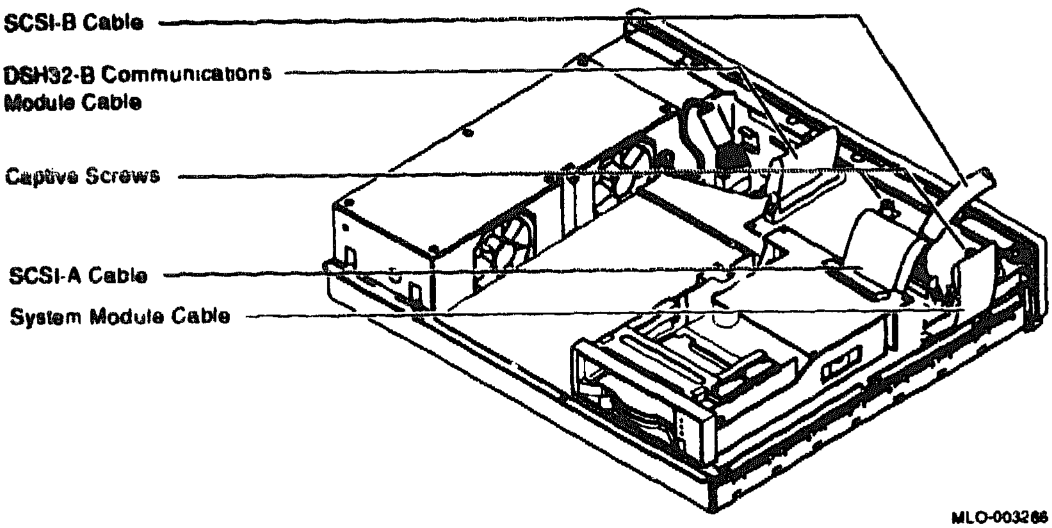
4.2.3 Distribution Board Removal

Figure 4–7 identifies the connectors on the distribution board. Remove the distribution board as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Disconnect the SCSI-A cable and the SCSI-B cable from the distribution board. See Figure 4–6.

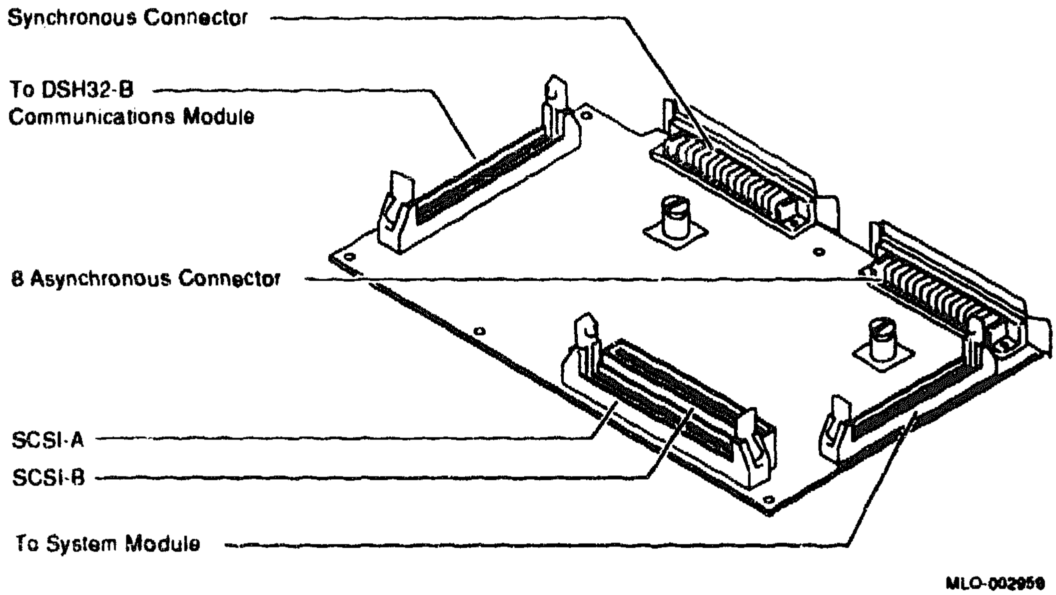
3. Disconnect the DSH32-B communications module cable (if installed) and the system module cable from the distribution board. See Figure 4–6.
4. Unscrew the two captive grounding screws on the distribution board. See Figure 4–6.

Figure 4–6 Removing the Distribution Board



5. Release the distribution board from the five standoffs and lift it out of the system box.

Figure 4-7 Distribution Board Connectors



4.2.4 RZ23 Disk Drive Removal

Up to three RZ23 hard disk drives can be installed on the drive mounting panel. The System disk and one other can be connected to the SCSI-A bus and a third can be connected to the SCSI-B bus.

All RZ23 disk drives contain an internal FRU called the drive module /frame. See Figure 4-8. Once you remove the drive from the system, you must always replace the drive module/frame first before replacing the whole drive.

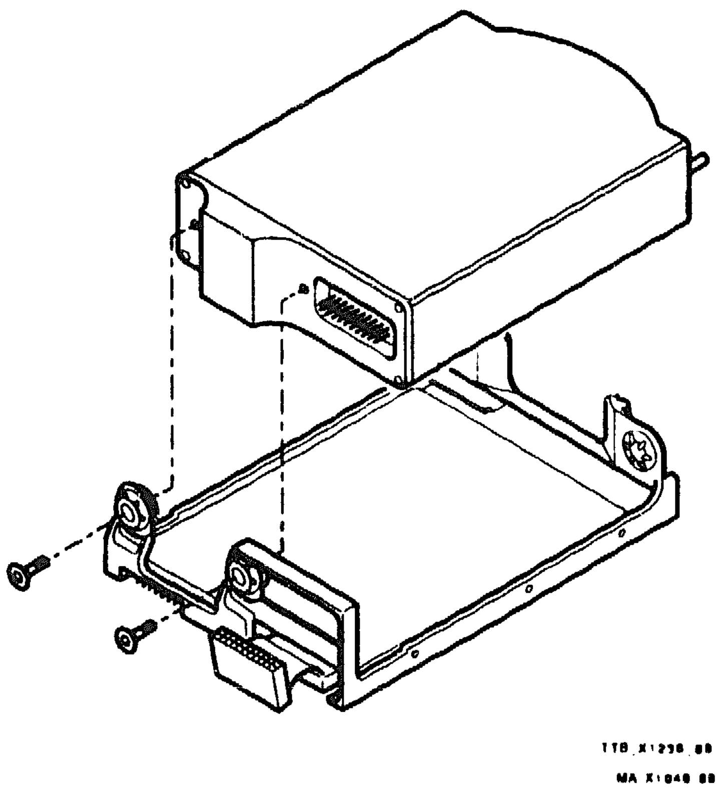
If replacing the drive module/frame does not fix the fault in the drive, you must replace the drive as one FRU since the head/disk assembly (HDA) is not a separate FRU.

The following procedure describes how to remove a drive from the system and remove and replace the drive module/frame:

1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Section 4.2.2.
3. Turn the drive mounting panel over and while supporting the RZ23 with one hand, remove the four screws from the drive.

4. Disconnect the drive interconnect cable and remove the two screws with an 1/8 inch Allen wrench. See Figure 4–8.

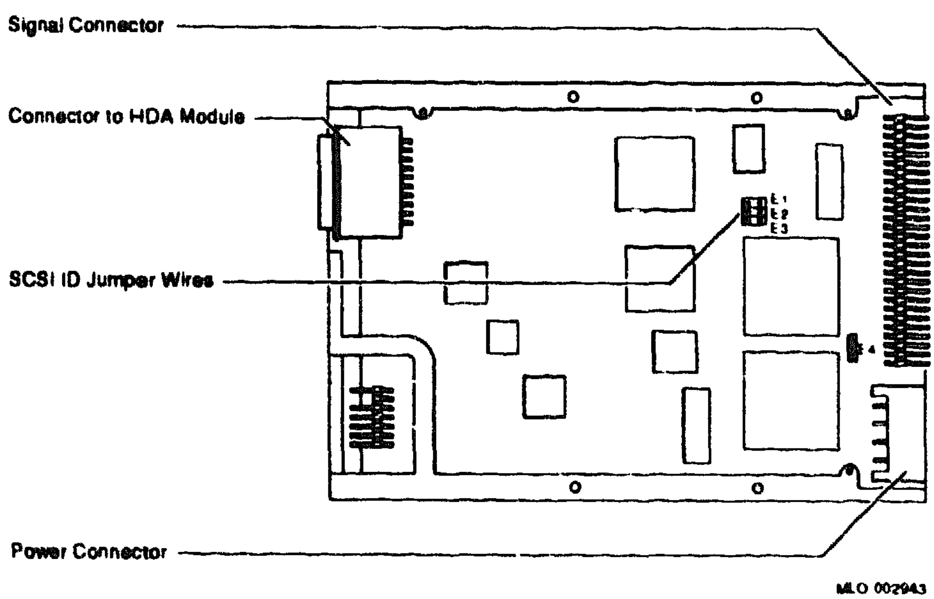
Figure 4–8 Removing the HDA



CAUTION
RZ23 disks are fragile. Handle them with care.

5. Push the HDA back against the rubber stops then lift up the front of the HDA and remove it from the frame.
6. Slide the HDA into the rubber stops on the new drive module/frame.
7. Screw in the two new screws supplied.
8. Connect the drive interconnect cable on the new drive module/frame to the HDA.
9. Position the jumpers on the new drive module to the same position as the jumpers on the drive module you just removed. See Figure 4–9.

Figure 4–9 RZ23 SCSI ID Jumper Locations



4.2.5 TZ30 Tape Drive Removal

The TZ30 tape drive (if installed) is located on the right-hand side of the drive mounting panel as viewed from the front.

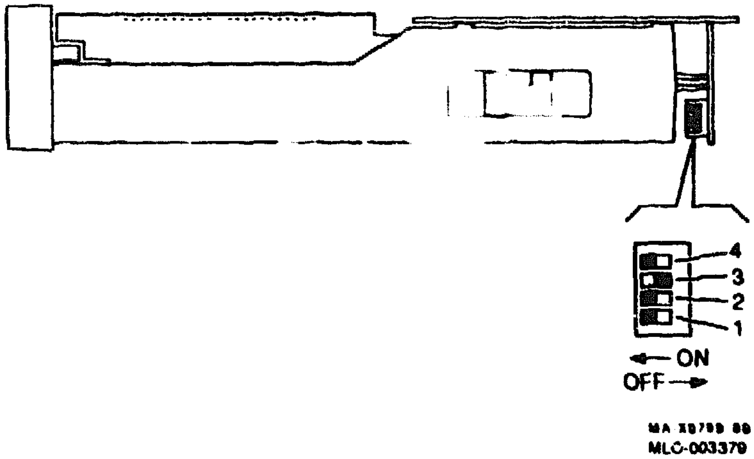
Remove the TZ30 tape drive as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Figure 4–5.
3. Turn the drive mounting panel over and while supporting the TZ30 with one hand, loosen two of the screws holding the drive to the mounting panel and remove the other two screws.
4. Slide the drive to one side and remove it from the mounting panel.
5. Set the switches on the right side of the new TZ30 to the setting on the TZ30 you removed. Usually the switches are set as shown in Figure 4–10.

NOTE

1. **Ensure the rubber grommets stay in place.**
2. **Route the TZ30 power cable through the signal cable to make assembly easier.**

Figure 4–10 TZ30 Jumper Switch Location



4.2.6 RX23 Diskette Drive and FDI Board Removal

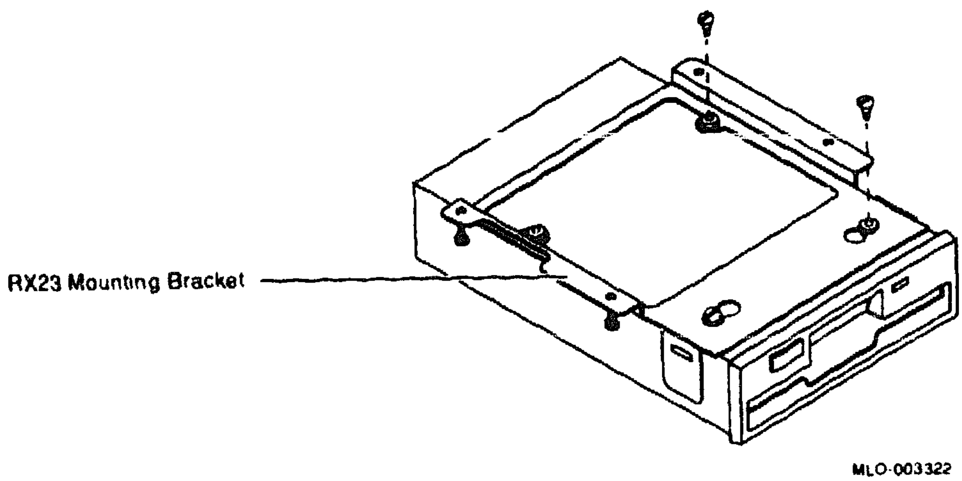
The drive mounting panel can contain an RX23 diskette drive in the right-hand compartment.

Remove the RX23 diskette and the FDI board drive as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Disconnect the power and signal cables from the back of the RX23 diskette drive.

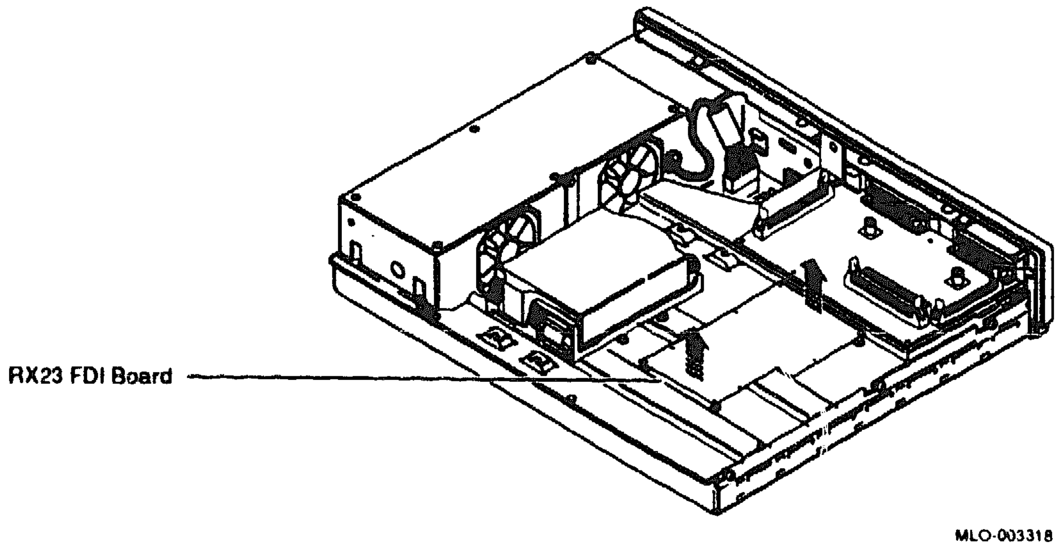
3. Unscrew the four screws securing the RX23's mounting bracket to the drive mounting panel and lift out the RX23 with the bracket assembly attached. See Figure 4–11.

Figure 4–11 RX23 Mounting Bracket Screws



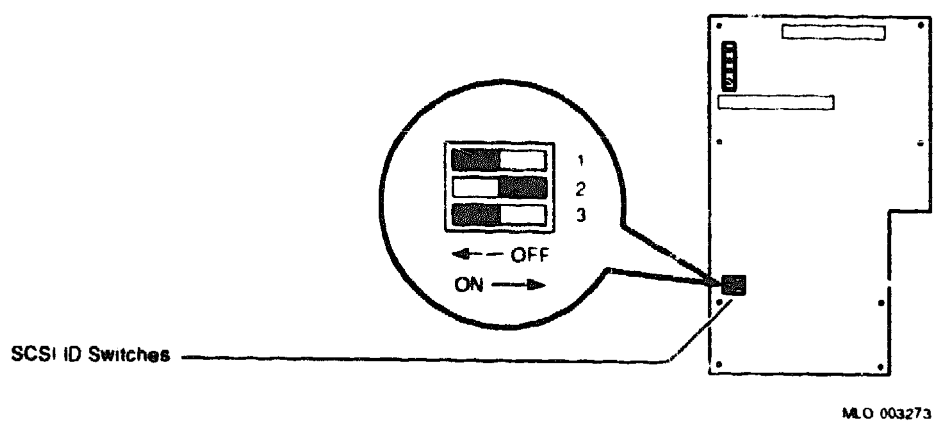
4. Remove the four screws securing the faulty RX23 to the mounting bracket.
5. Disconnect all power and signal cables connected to the FDI board.
6. Release the FDI board from the four standoffs, then lift it off the drive mounting panel. See Figure 4–12.

Figure 4–12 Removing the FDI Board



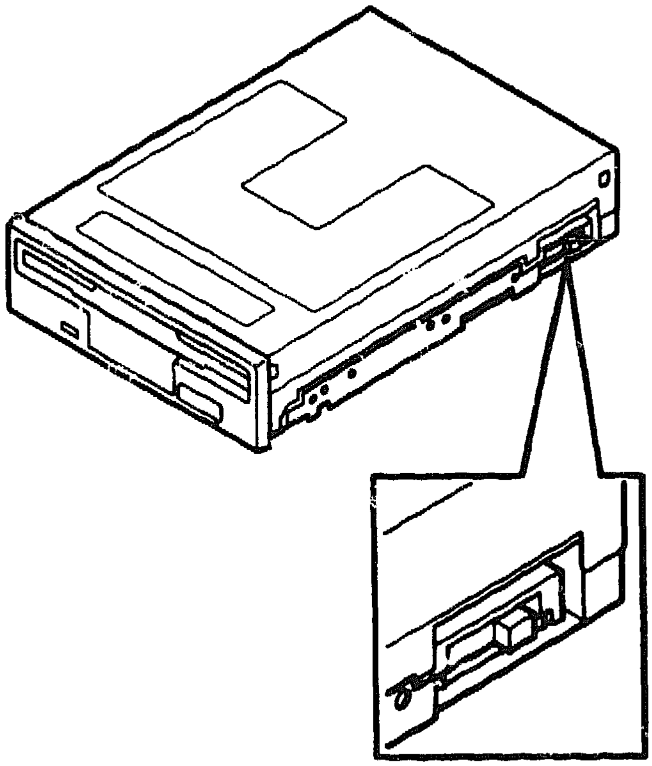
7. Set the switches on the new FDI board to the settings on the drive you removed. See Figure 4–13.

Figure 4–13 FDI Board SCSI Switch Locations



8. Set the select switch on the new drive to the setting on the drive you removed. See Figure 4–14.

Figure 4–14 RX23 Select Switch Position

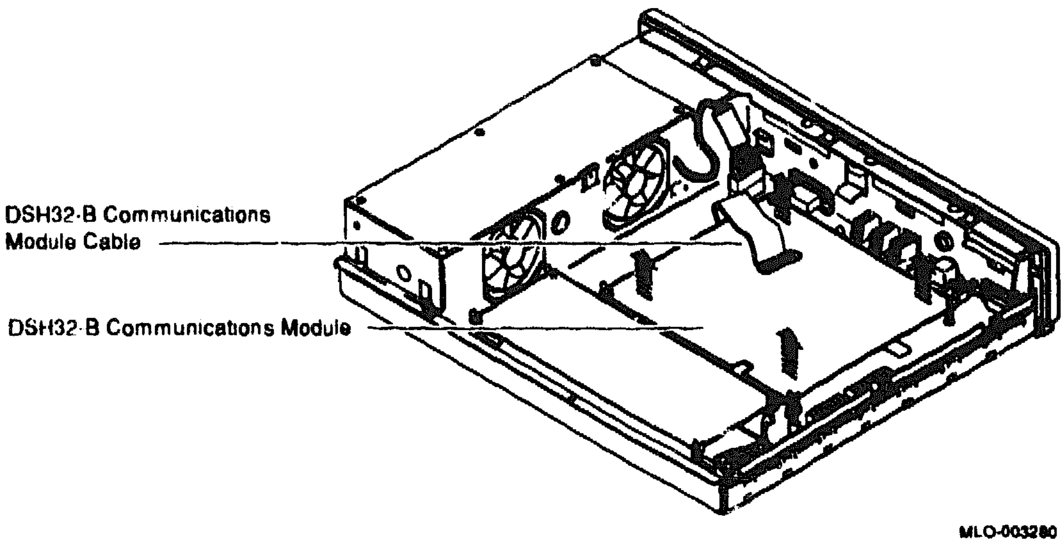


4.2.7 DSH32-B Communications Module Removal

Remove the DSH32-B communications module (if installed) as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Section 4.2.2.
3. Release the DSH32-B communications module from the four standoffs, then lift it off the system module. See Figure 4–15. Two connectors disconnect as you lift the module.

Figure 4–15 DSH32-B Communications Module Removal



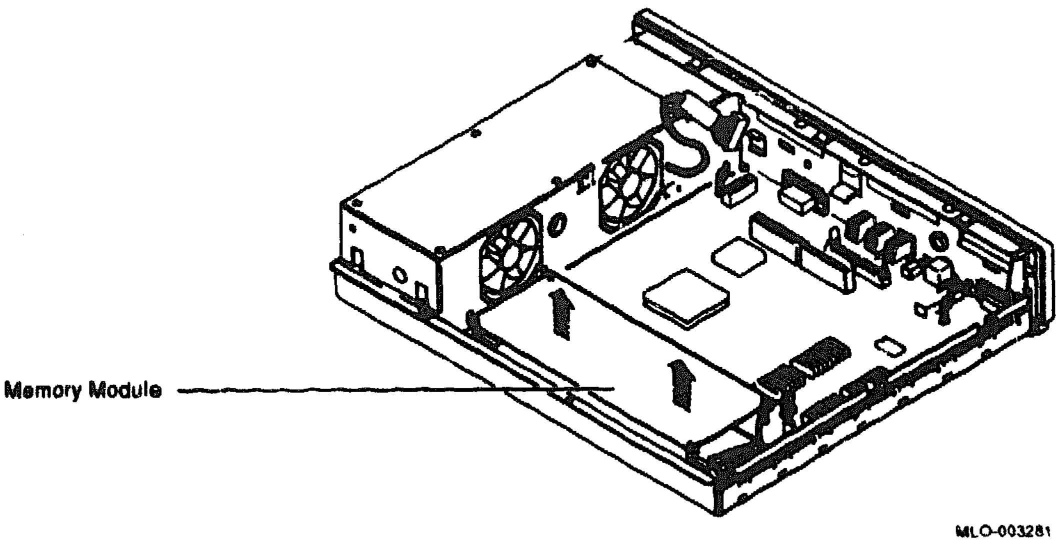
4.2.8 Memory Module Removal

There are three memory modules available: 4Mb, 12Mb, and 16Mb modules. The 4Mb and 12Mb modules are physically the same. The 16Mb module is slightly larger than the other two and it contains two additional connectors that allow one of the other two memory modules to be connected piggyback style. This piggyback connection allows the 4Mb and 12Mb modules to increase the total memory in the system to 24Mb and 32Mb (including 4Mb on the system module). The removal procedure for all memory modules is the same.

Remove the memory modules as follows:

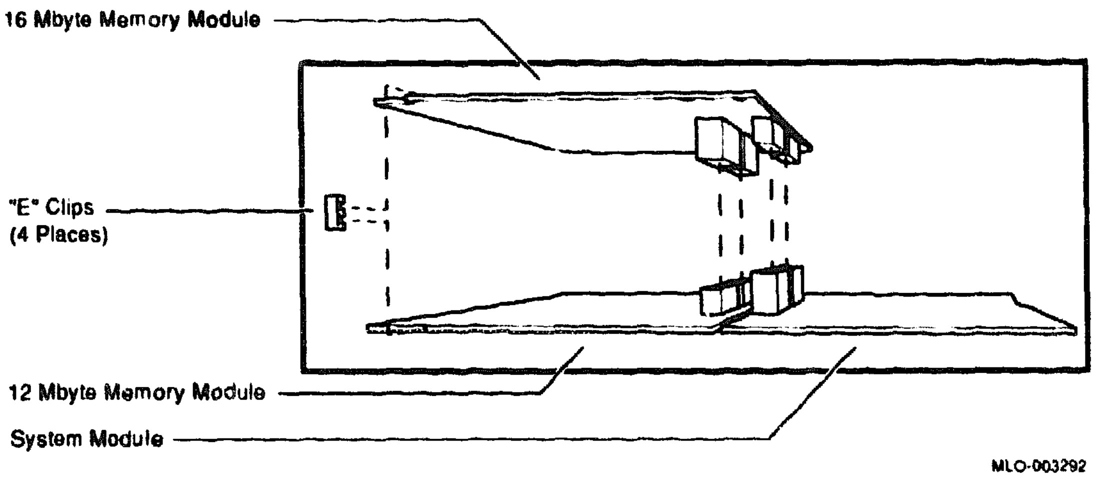
1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Section 4.2.2.
3. Release the memory module from the four standoffs, then lift the memory module off the system module. See Figure 4–16. Two connectors disconnect as you lift the module.

Figure 4–16 Memory Module Removal



4. If the 16Mb memory module is installed and a 4Mb or 12Mb memory module is attached, separate the two modules and replace the faulty module (see Figure 4–17). Reassemble the two modules before reinstalling them onto the system module.

Figure 4–17 16Mb Memory Module



4.2.9 System Module Removal

Remove the system module as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Section 4.2.2.
3. Disconnect all cables from the back of the system box.
4. Release the DSH32-B communications module (if installed) from the four standoffs, then lift the DSH32-B communications module off the system module. See Figure 4–15. Two connectors disconnect as you lift the module.
5. Release the memory module from the four standoffs, then lift the memory module off the system module. See Figure 4–16. Two connectors disconnect as you lift the module.
6. Disconnect the power cable and the battery cable from the system module. See Figure 4–18.

   NOTE

   The power cable connector has a release tab which must be pressed to remove it from the system module.

7. Remove the eight screws from the system module. See Figure 4–18.
8. Remove the system module by carefully popping the two front corners off the two locating standoffs.

   NOTE

   When reinstalling the system module, install the connector end first through the openings in the rear of the box. Push the module back to load the connector ground tabs and then snap the module onto both locating standoffs. All screw holes will then be aligned.

   CAUTION

   Be careful not to bend the pins on the ROM.

9. Remove the Ethernet ID ROM from the system module you removed (see Figure 4–19). Check the position of pin 1 (notched) on the ROM. Install the ID ROM on the new system module.

10. Set the baud rate jumper on the new system module to the setting on the system module you removed. See Figure 4–22.

Figure 4–18 System Module Screw Locations

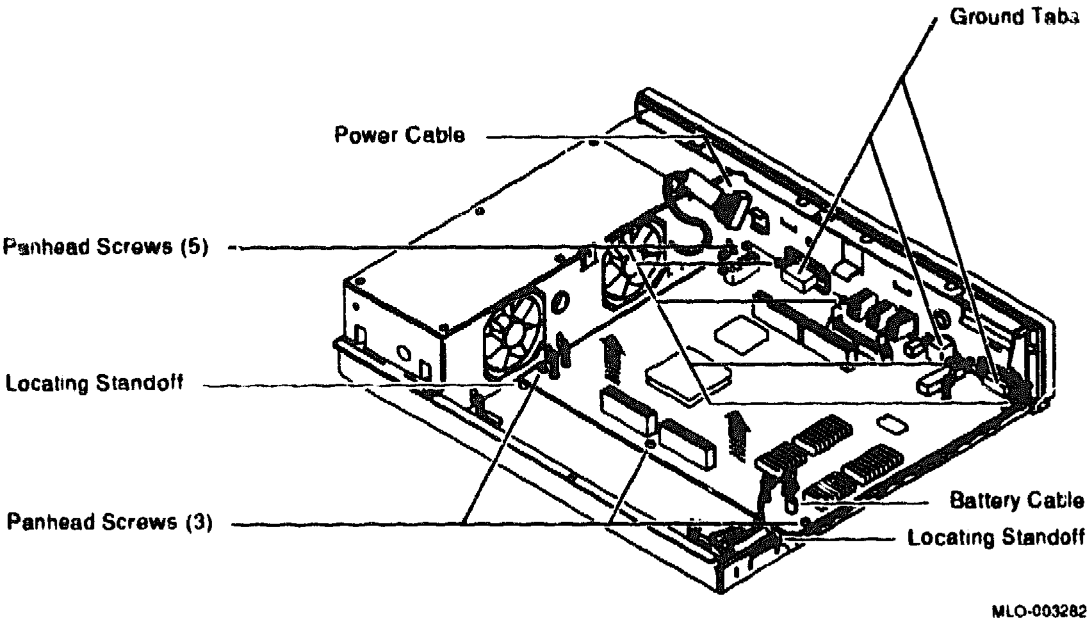
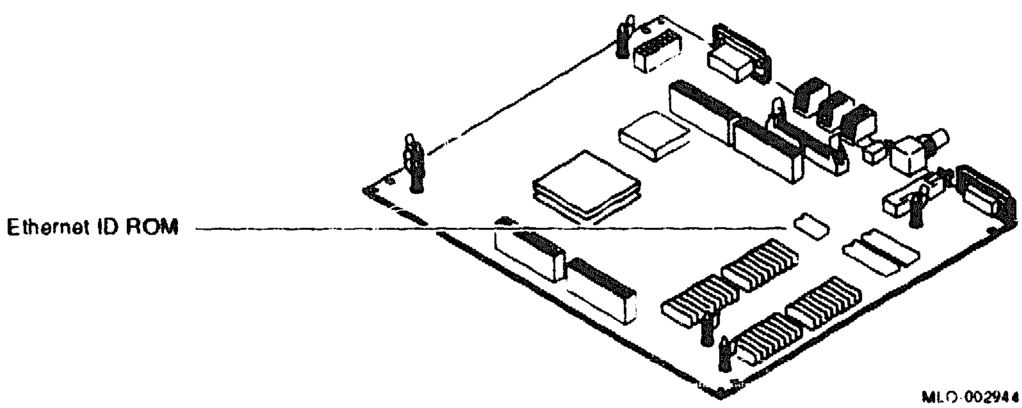


Figure 4–19 Location of Ethernet ID ROM on System Module

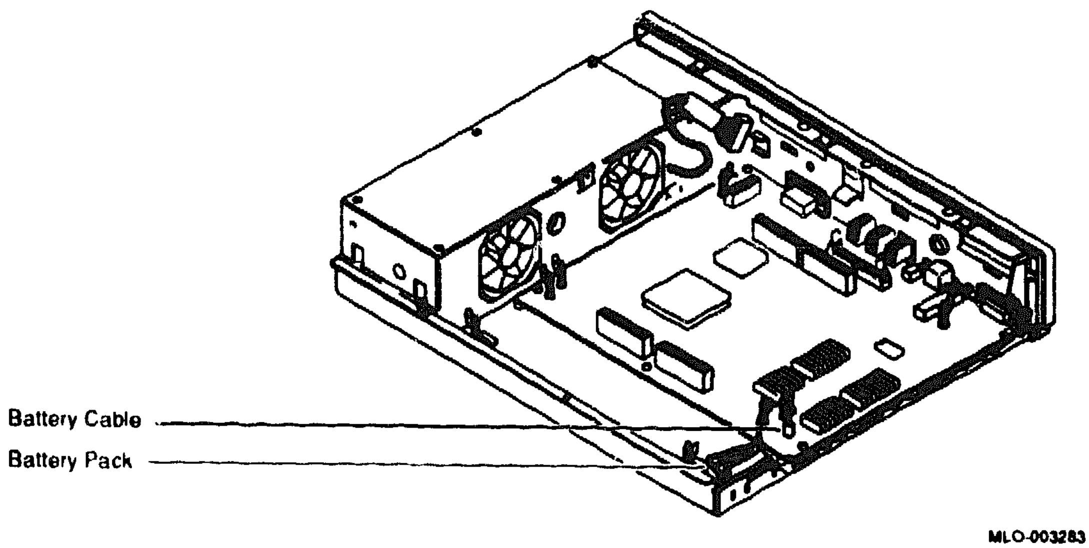


4.2.10 Battery Pack Removal

Remove the battery pack as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Section 4.2.2.
3. Disconnect the battery cable from the system module. See Figure 4–20.

Figure 4–20 Battery Cable Location



4. Remove the battery pack from its holder.

NOTE

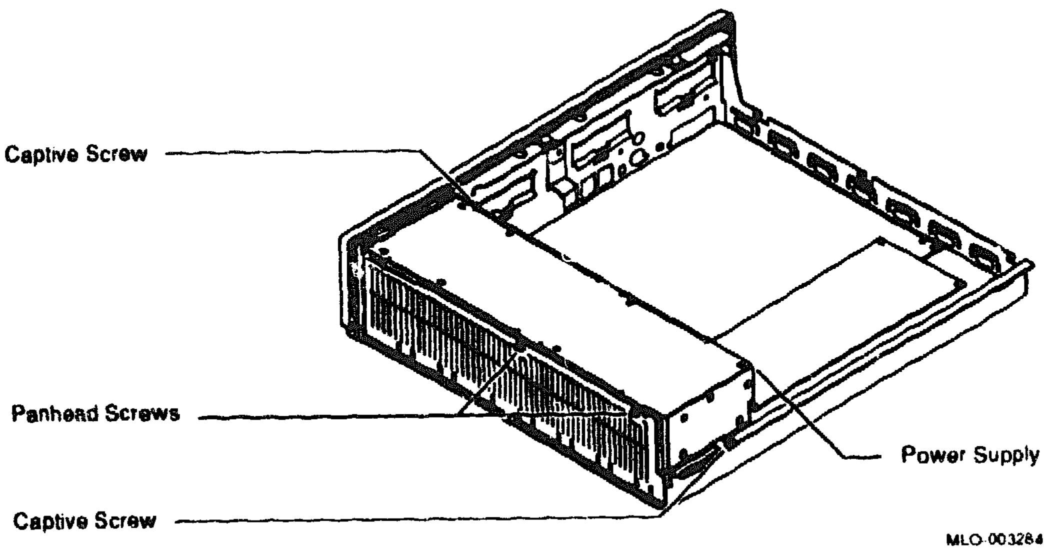
A new battery needs a minimum of 17 hours of continuous power to fully charge the battery. If the battery's charge is low, you will see an error for the NVR (0000.0005) when you power up the system.

4.2.11 Power Supply Removal

Remove the power supply as follows:

1. Remove the system box cover. See Section 4.2.1.
2. Remove the drive mounting panel. See Section 4.2.2.
3. Disconnect the power cable from the system module.
4. Loosen the two captive screws and the two panhead screws. See Figure 4–21.

Figure 4–21 Power Supply Screw Locations



5. Disconnect the two cables that supply power to the storage devices from the faulty power supply.
6. Lift the faulty power supply out of the system box.

4.3 Options

This section describes the options available for the system.

4.3.1 Internal Memory Options

Three memory modules are available: a 4Mb memory module, a 12Mb memory module, and a 16Mb memory module. Only one memory module can be plugged into the system module unless the 16Mb memory module is installed. The 16Mb module has extra connectors which allows one of the 4Mb or 12Mb memory modules to be plugged into it piggyback style. With the 16Mb module plugged into the system module, a total of 24Mb or 32Mb memory is possible (4Mb on the system module and the 12Mb module piggybacked on the 16Mb module = 32Mb).

The procedure used to install memory modules is the reverse of the procedure listed in Section 4.2.8.

4.3.2 DSH32-B Communications Module Options

The DSH32-B communications module is in the system box and plugs directly into the system module. The DSH32-B communications module provides one eight line asynchronous port and one synchronous port.

The procedure used to install the DSH32-B communications module is the reverse of the procedure listed in Section 4.2.7.

4.3.3 Optional Storage Device Positioning

In Model 10 systems, up to three devices can be installed on the drive mounting panel within the system enclosure. Depending on your system configuration, your system may contain these devices in the combinations listed in Table 4–2.

Table 4–2 Model 10 Internal Storage Device Combinations

Drive Mounting Panel	
Left Compartment [1]	**Right Compartment**
One RZ23	TZ30
One or two RZ23s	RX23
One or two RZ23s	RZ23

[1]If only one RZ23 hard disk drive is installed in the left compartment, it is mounted in parallel with the device in the right compartment. If two RZ23s are installed, they are mounted side by side and at right angles to the device in the right compartment.

If the system already has two storage devices installed and you want to install another, it may be necessary to move the device in the left compartment to the position shown in Figure 4–4. Install the third device in parallel with the device you have just moved.

4.4 Changing the Maximum Baud Rate of the MMJ Ports and the Modem Port

When the system is delivered, the maximum baud rate of MMJ ports 1, 2, 3, and MODEM is preset to 19.2 Kbaud. This baud rate can be changed to 19.8 Kbaud or 38.4 Kbaud by repositioning jumpers on the system module.

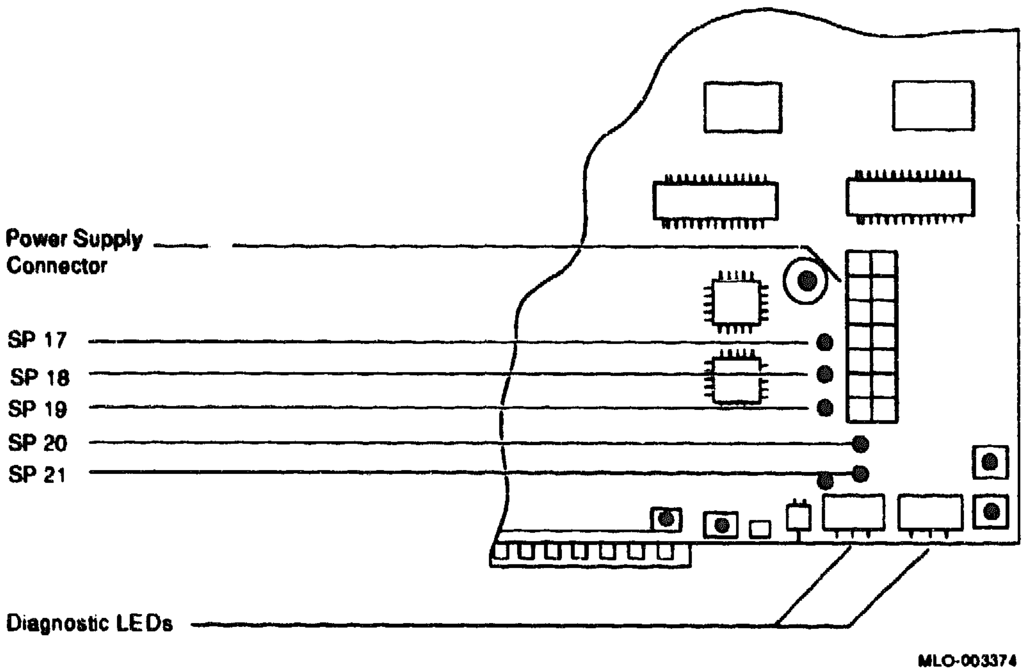
Table 4–3 shows the nodes on the system module that must be linked by jumpers to obtain the desired baud rate.

Figure 4–22 shows the position of the nodes on the system module.

Table 4–3 Jumper Settings for Serial Port Baud Rates

Baud Rate	Nodes Linked
19.2 Kbaud (default)	SP18 and SP19
19.8 Kbaud	SP18 and SP19 SP20 and SP21
38.4 Kbaud	SP17 and SP18

Figure 4–22 Location of Nodes on the System Module



5 The Model 20 System

5.1 Enclosure Description

The MicroVAX 3100 Model 20 and VAXserver 3100 Model 20 are similar in appearance. To identify which system you are working on, look at the nameplate on the front of the system box.

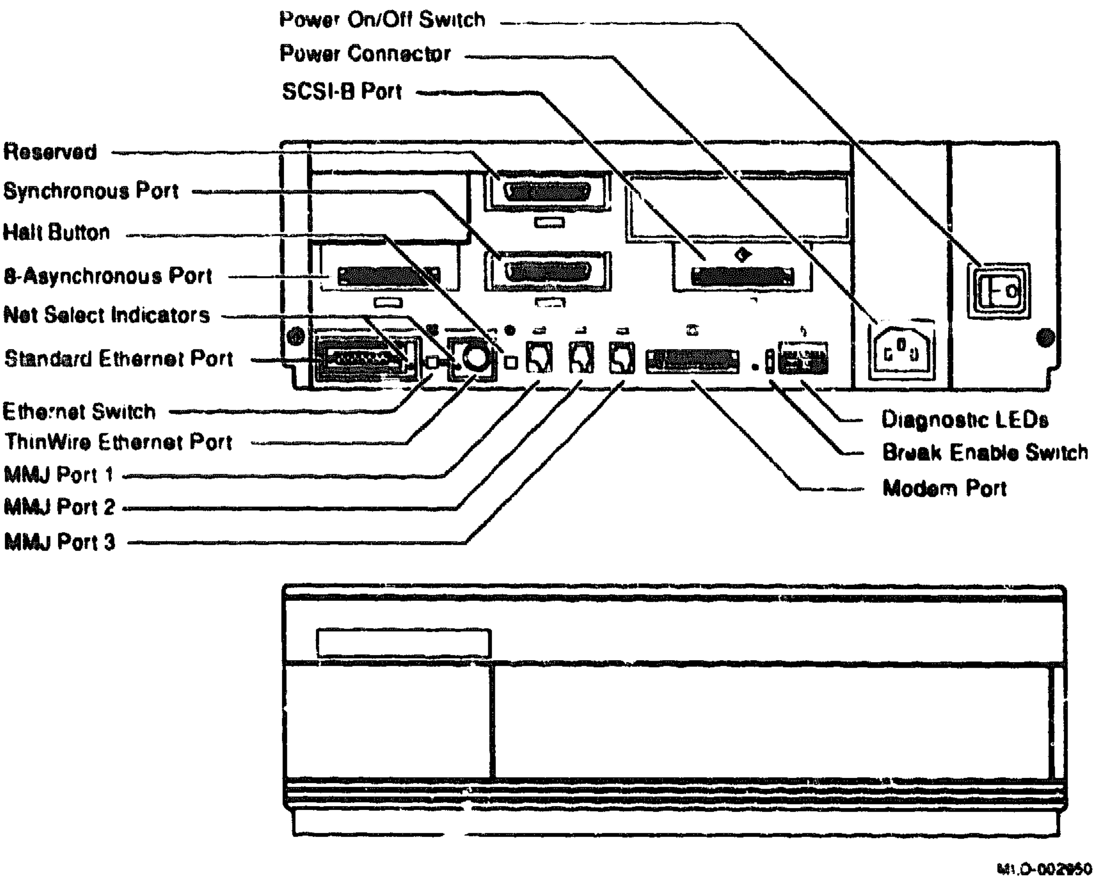
The system box contains up to 13 Field Replaceable Units (FRUs):

- System module
- Memory module
- Second memory daughter board
- DSH32-B communications module
- Floppy diskette interface (FDI) board
- Power supply
- Distribution board
- Battery pack
- Up to five internal mass storage devices (TZ30 tape drive, RX23 diskette drives, and RZ23 disk drives)

There are also three expansion boxes available that contain additional mass storage devices (TK50Z expansion box, RZ55 disk drive expansion box, and an RRD40 compact disc expansion box).

Figure 5–1 shows the front and rear panel of the system box.

Figure 5–1 Model 20 System Box



You can connect VTxxx terminals to a MicroVAX 3100 or VAXserver 3100 through MMJ ports 1, 2, and 3. A fourth Vtxxx terminal can be connected if an adapter (H8571-A) is fitted to the modem port (RS232). To connect more terminals, your system must have a DSH32-B communications module with a cable concentrator connected to the eight-asynchronous port. The cable concentrator provides an additional eight MMJ ports. Alternatively, you can connect printers or modems to these MMJ ports if you wish.

Connection to the Ethernet is done through either the ThinWire Ethernet port or the standard Ethernet port depending on which type of Ethernet network is available. The position of the Ethernet switch determines which of the Ethernet ports provides IEEE 802.3 network communications. An LED is lit beside the enabled port.

The external SCSI port is used to connect external mass storage devices to the system.

The position of the BREAK ENABLE switch at powerup determines the function of MMJ port 3. If the switch is in the down position at powerup, the port functions as a normal communications port. If the switch is in the up position, the port functions as an alternative console port to which you can connect a VTxxx terminal. When the VTxxx terminal connected to the MMJ port 3 is enabled, you can press the BREAK key on the keyboard to enter console mode directly.

5.2 FRU Removal and Replacement

This section describes the removal and replacement procedures for the FRUs in the MicroVAX 3100 or VAXserver 3100 system. Refer to Table 5-1 to find the name of the FRU that needs replacing. Then go to the section listed opposite the FRU entry. Follow the steps in the section to remove the FRU and reverse the procedures to replace the FRU. Always test the replaced device for proper operation.

CAUTION

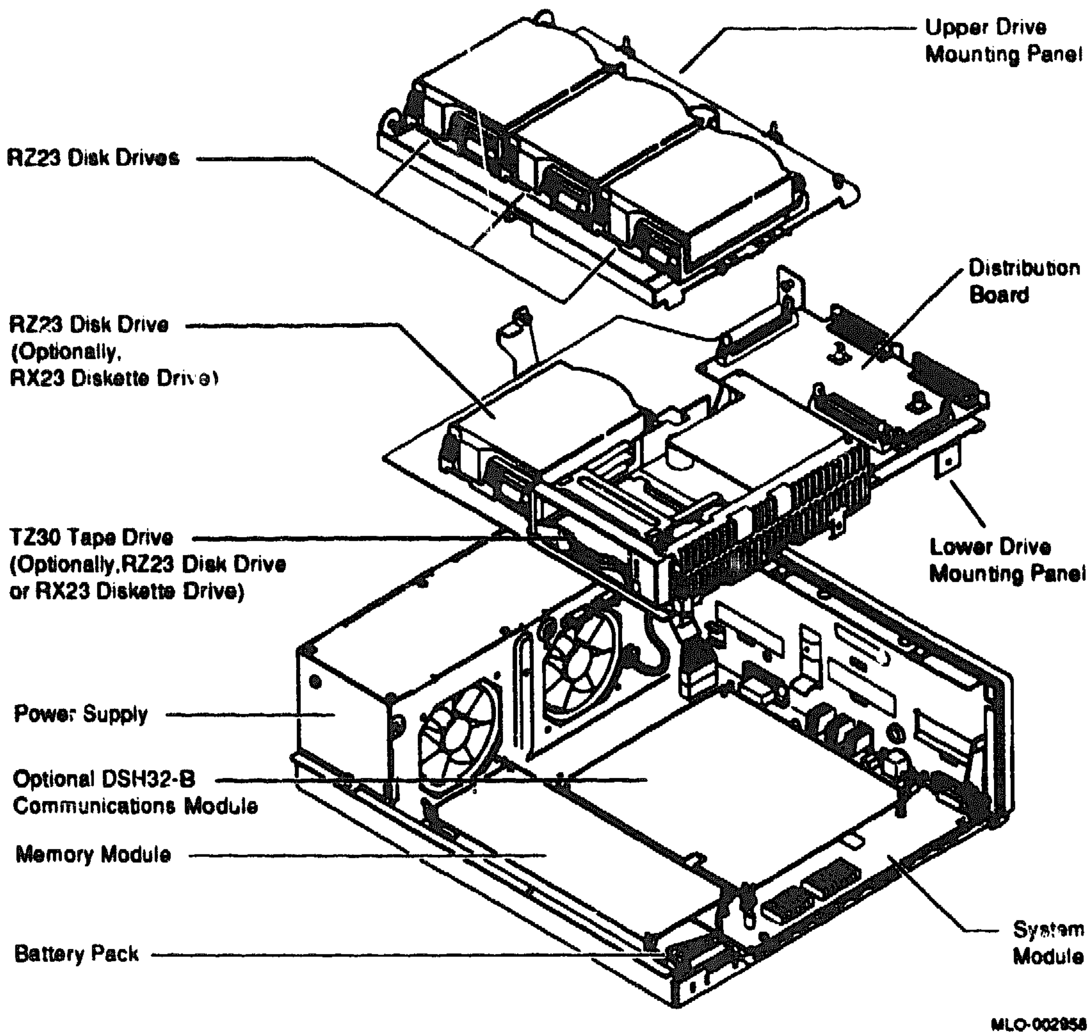
Wear a static wrist strap and use a static mat when replacing FRUs.

Table 5-1 FRU Section Listings

FRU	Section
Distribution board	5.2.4
RZ23 disk drive	5.2.5
TZ30 tape drive	5.2.6
RX23 diskette drive	5.2.7
DSH32-B communications module	5.2.8
Memory modules	5.2.9
System module	5.2.10
Battery pack	5.2.11
Power supply	5.2.12

Figure 5–2 shows the locations of the FRUs.

Figure 5–2 FRU Locations

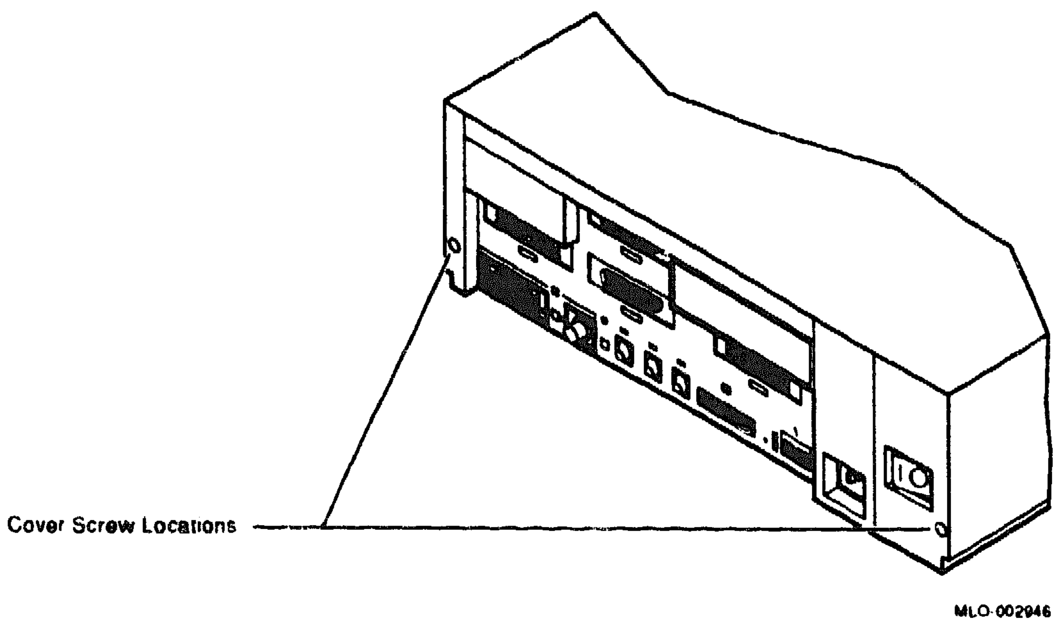


5.2.1 System Box Cover Removal

Remove the system box as follows:

1. Turn the system power switch off.
2. Disconnect all the cables connected to the system unit.
3. Loosen the two cover screws on the rear panel of the system box. See Figure 5–3.
4. Slide the cover forward and up off the system box.

Figure 5–3 Cover Screw Locations



5.2.2 Upper Drive Mounting Panel Removal

Depending on the configuration, the upper drive mounting panel may contain one, two, or three RZ23 hard disk drives.

Remove the upper drive mounting panel as follows:

1. Remove the system box cover. See Section 5.2.1.

CAUTION

You must note which cables connect to which drives when disconnecting them. Write the type of drive and its position on a piece of tape and wrap the tape around the connector before disconnecting it. This will help you when reinstalling the drives.

2. Disconnect the power cables and the SCSI bus cables from the drives on the upper drive mounting panel. See Figure 5–4.
3. Unscrew the four captive screws. See Figure 5–5.
4. Lift the upper drive mounting panel from the lower drive mounting panel and gently set it aside.

Figure 5–4 Drive Mounting Panel Power and Signal Cabling

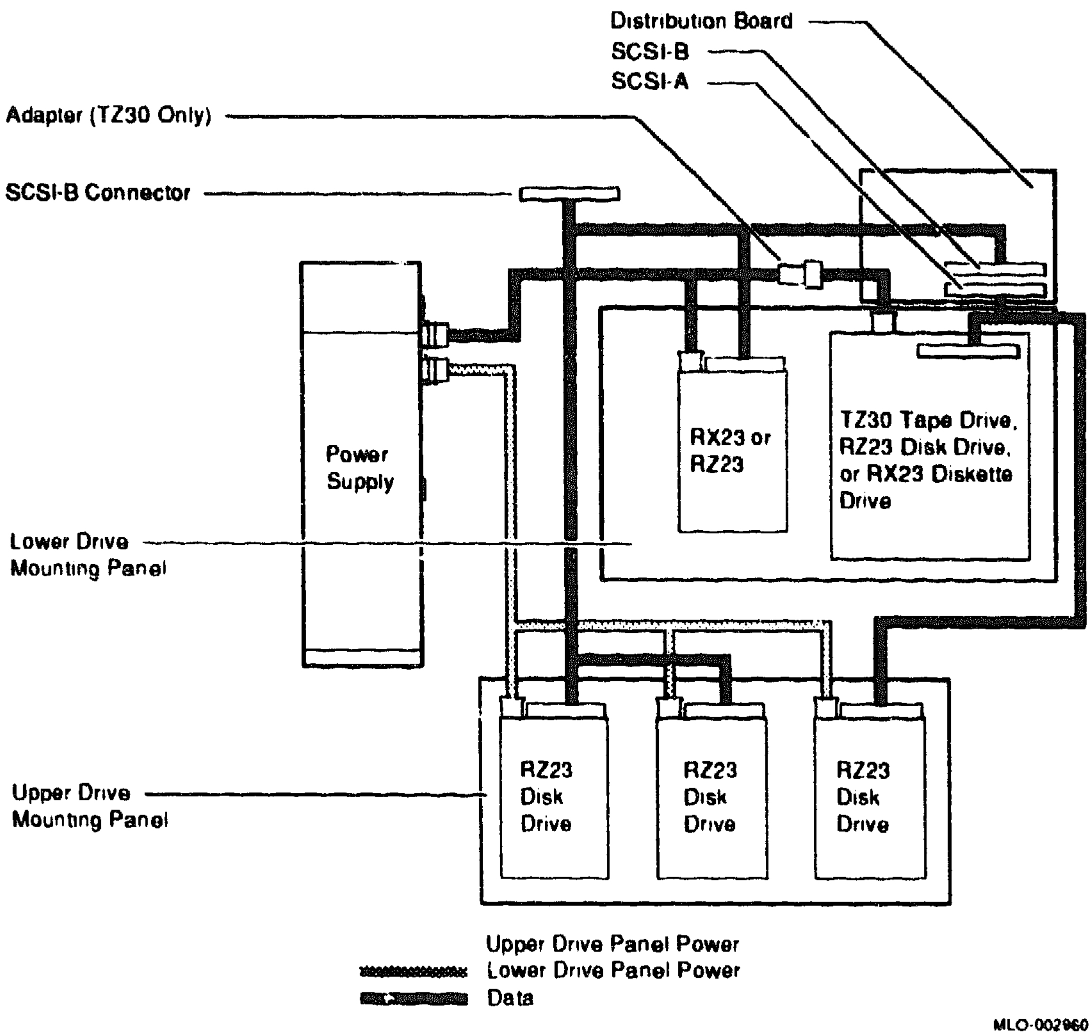
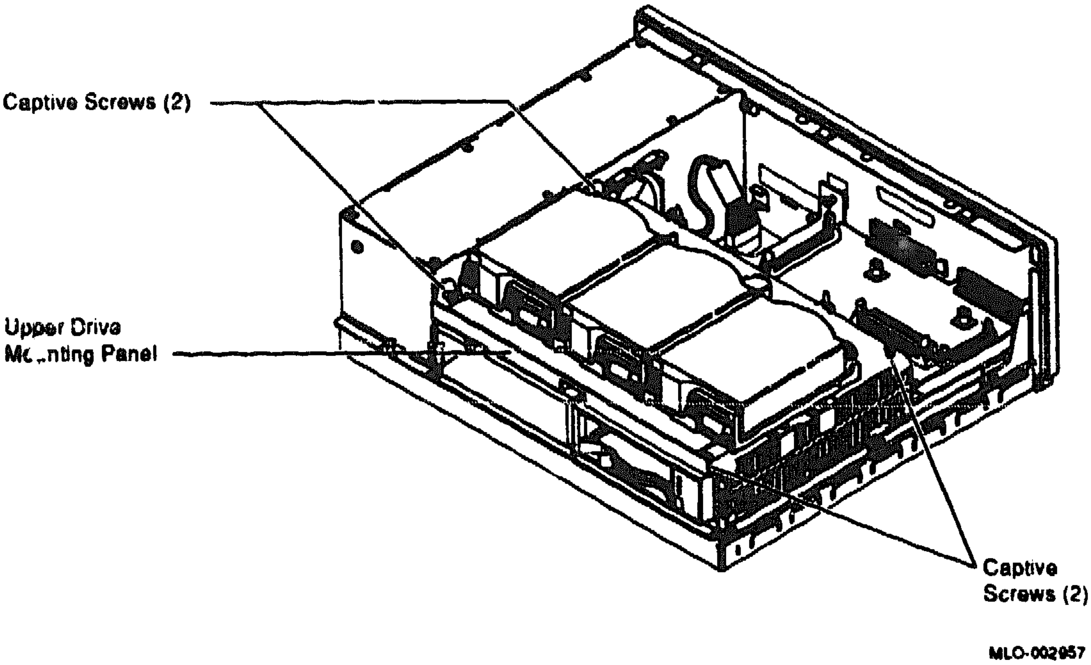


Figure 5–5 Unscrewing the Upper Drive Mounting Panel



5.2.3 Lower Drive Mounting Panel Removal

The lower drive mounting panel contains storage devices in one of the combinations given in Table 5–2, depending on the configuration.

Table 5–2 Lower Drive Mounting Panel Device Combinations

Left-Hand Compartment	Right-Hand Compartment
RZ23 hard disk	TZ30 tape drive
RX23 diskette drive	TZ30 tape drive
RZ23 hard disk	RX23 diskette drive
RX23 diskette drive	RX23 diskette drive
RZ23 hard disk	RZ23 hard disk

Remove the lower drive mounting panel as follows:

1. Remove the upper drive mounting panel if not already removed. See Section 5.2.2.
2. Disconnect the SCSI and power cables connected to the drives on the lower drive mounting panel Figure 5–4.
3. Disconnect the cables connecting the distribution board to the system module and DSH32-B communications module (if installed). See Figure 5–6.
4. Unscrew the seven screws. See Figure 5–7.
5. Slide the panel forward (with the devices attached) then lift the panel from the system box and gently set it aside.

Figure 5–6 Distribution Board Cabling

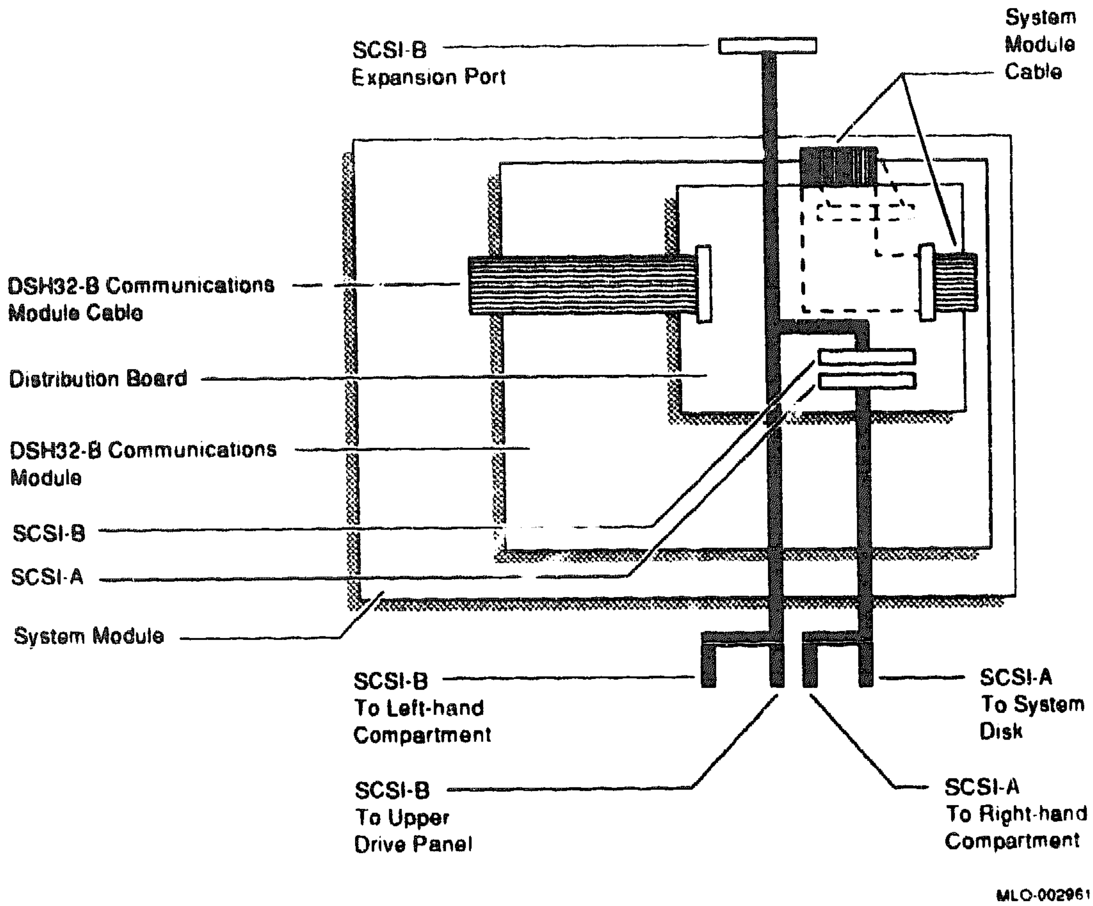
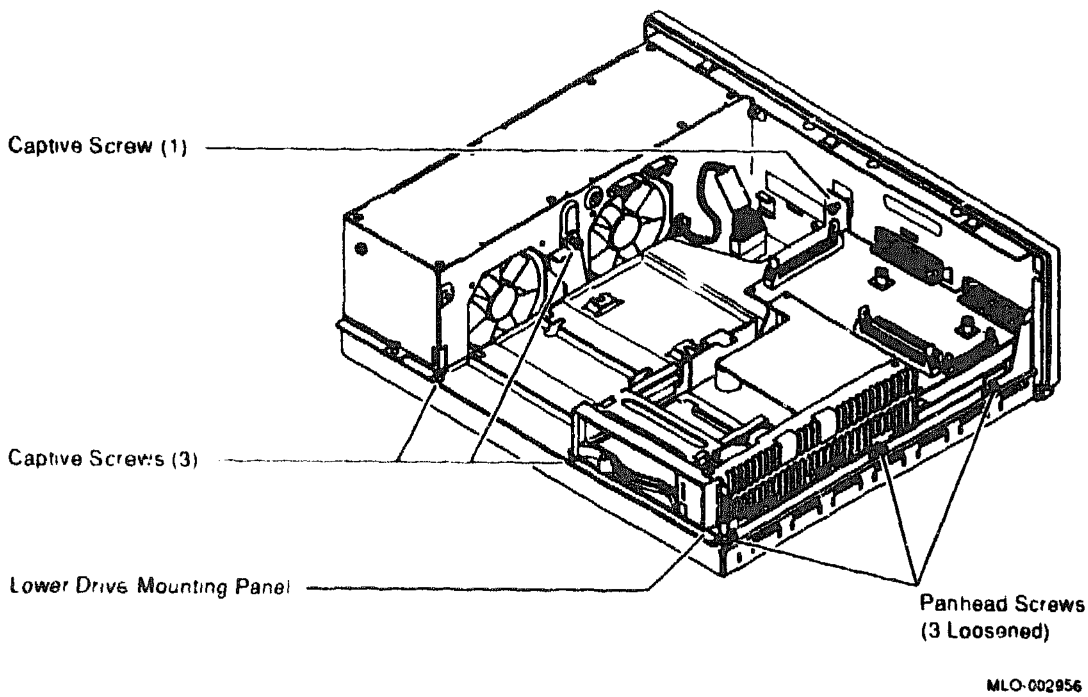


Figure 5–7 Unscrewing the Lower Drive Mounting Panel



5.2.4 Distribution Board Removal

Figure 5–9 shows the connector locations on the distribution board for reference. Remove the distribution board as follows:

1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Disconnect the SCSI-A cable and the SCSI-B cable from the distribution board. See Figure 5–8.
4. Disconnect the DSH32-B communications module cable (if installed) and the system module cable from the distribution board.
5. Unscrew the two captive grounding screws on the distribution board See Figure 5–8.
6. Release the distribution board from the five standoffs and remove it.

Figure 5–8 Removing the Distribution Board

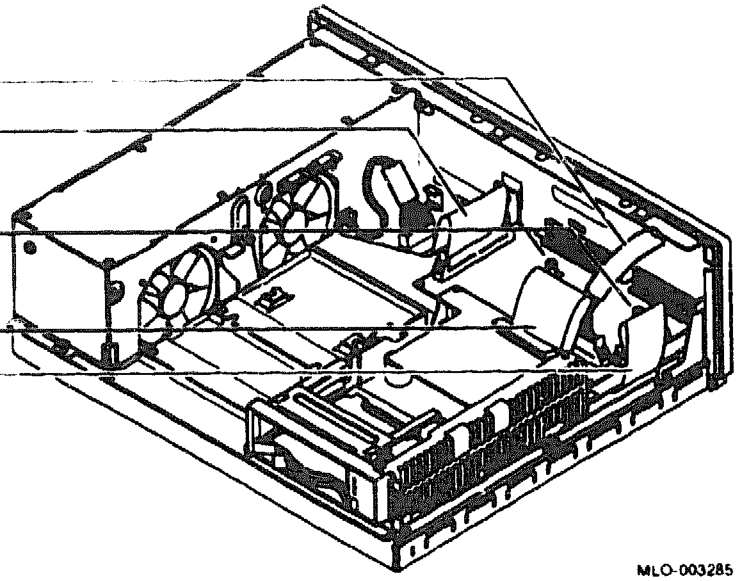
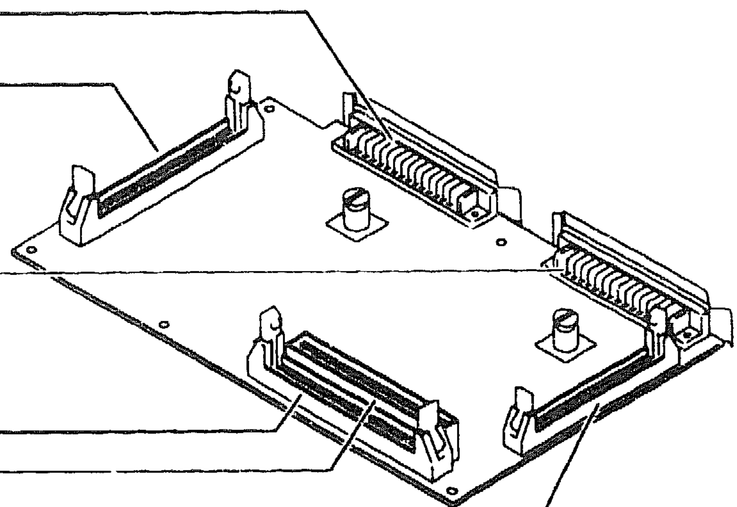


Figure 5–9 Distribution Board Connectors



5.2.5 RZ23 Disk Drive Removal

RZ23 hard disk drives can be installed on the upper or lower drive mounting panel or on both panels, depending on the system configuration.

Three RZ23 drives can be installed on the upper drive mounting panel. One of the drives is the system disk and connects to the SCSI-A bus while the other two are user disks and connect to the SCSI-B bus.

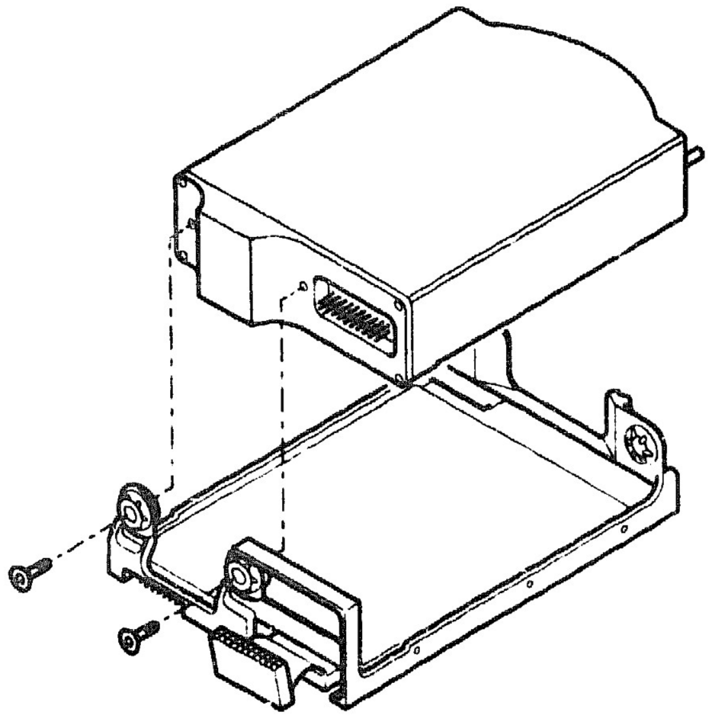
Two RZ23 drives can be installed on the lower drive mounting panel. The right-hand drive (as viewed from the front) is connected to the SCSI-A bus; the left-hand drive is connected to SCSI-B bus.

All RZ23 disk drives contain an internal FRU called the drive module /frame. See Figure 5–10. Once you remove the drive from the system, you must always replace the drive module/frame first before replacing the whole drive. If replacing the drive module/frame does not fix the fault in the drive, you must replace the drive as one FRU since the head/disk assembly (HDA) is not a separate FRU.

The following procedure describes how to remove a drive from the system and remove and replace the drive module/frame:

1. Remove the system box cover. See Section 5.2.1.
2. Remove the drive mounting panel to which the faulty drive is connected. See Section 5.2.2 or Section 5.2.3.
3. Turn the drive mounting panel over and while supporting the RZ23 with one hand, remove the four screws from the drive.
4. Disconnect the drive interconnect cable and remove the two screws with an 1/8 inch Allen wrench. See Figure 5–10.

Figure 5–10 Removing the HDA

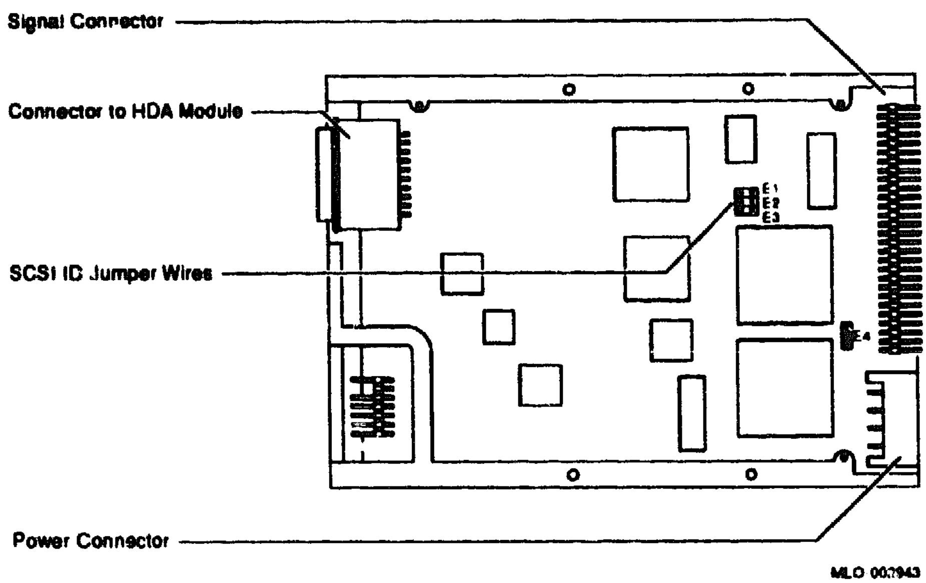


CAUTION

RZ23 disks are fragile. Handle them with care.

5. Push the HDA back against the rubber stops then lift up the front of the HDA and remove it from the frame.
6. Slide the HDA into the rubber stops on the new drive module/frame.
7. Screw in the two new screws supplied.
8. Connect the drive interconnect cable on the new drive module/frame to the HDA.
9. Position the jumpers on the new drive module to the same position as the jumpers on the drive module you just removed. See Figure 5–11.

Figure 5–11 RZ23 SCSI ID Jumper Locations



5.2.6 TZ30 Tape Drive Removal

The TZ30 tape drive is on the lower drive mounting panel, positioned on the right-hand side as viewed from the front.

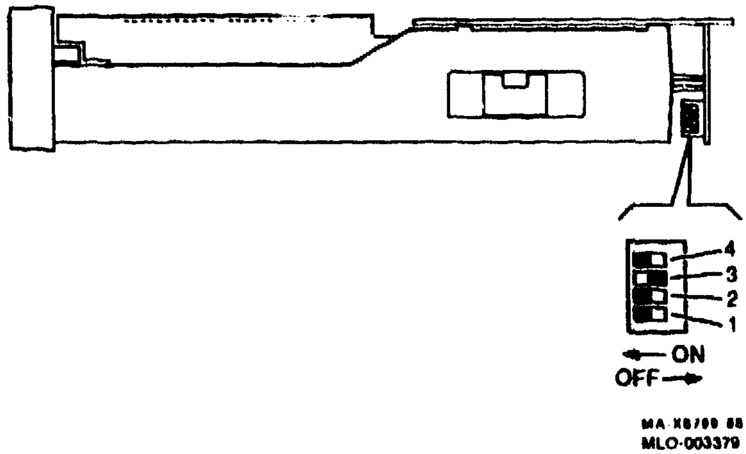
Remove the TZ30 tape drive as follows:

1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Remove the lower drive mounting panel. See Section 5.2.3.
4. Turn the lower drive mounting panel over and while supporting the TZ30 with one hand, loosen two of the screws holding the drive to the mounting panel and remove the other two screws.
5. Slide the drive to one side and remove it from the mounting panel.
6. Set the switches on the right side of the new TZ30 to the setting on the TZ30 you removed. See Figure 5–12.

NOTES

1. **Ensure the rubber grommets stay in place.**
2. **Route the TZ30 power cable through the signal cable to make assembly easier.**

Figure 5–12 TZ30 Jumper Switch Location



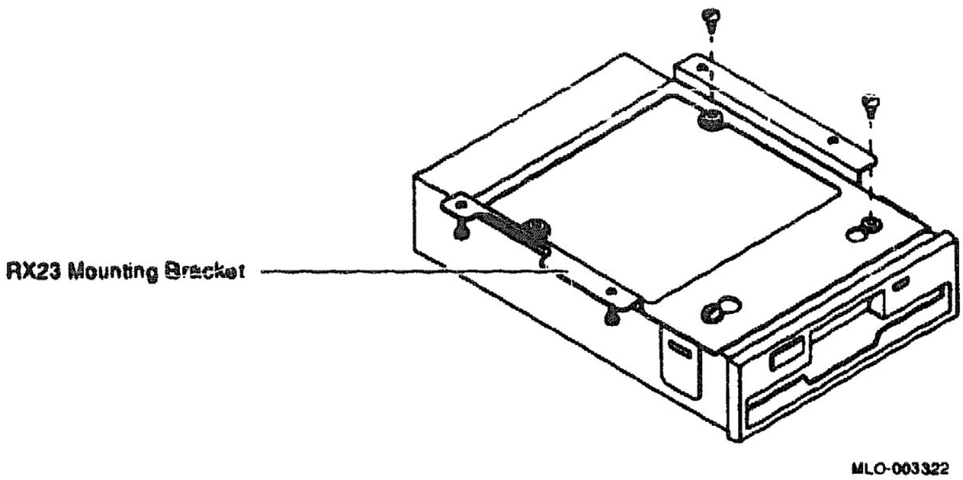
5.2.7 RX23 Diskette Drive and FDI Board Removal

The lower drive mounting panel can contain an RX23 diskette drive in the left or right compartment, or both.

Remove the RX23 diskette drive and FDI board as follows:

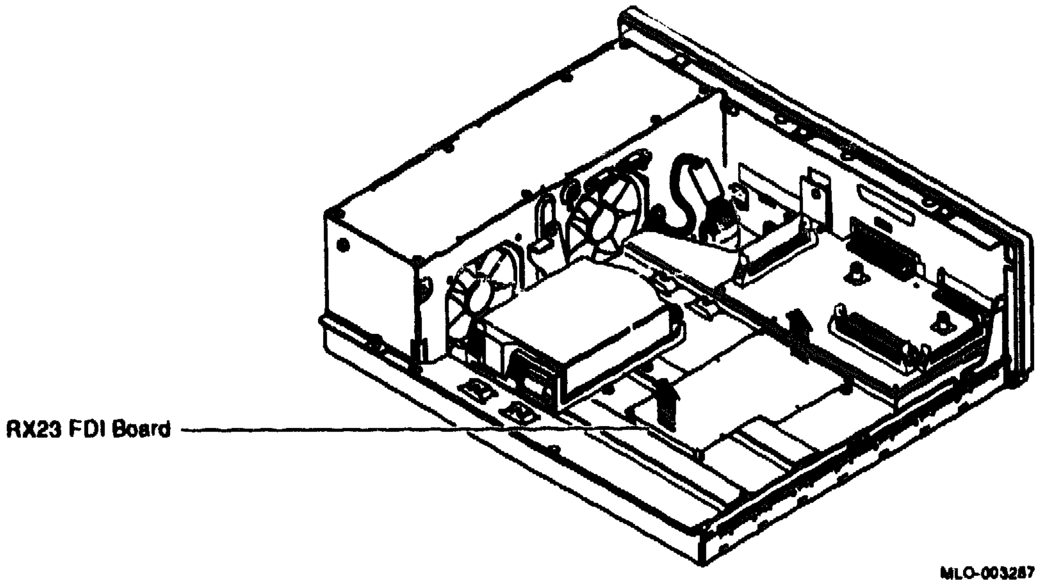
1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Unscrew the four screws securing the RX23's mounting bracket to the drive mounting panel and lift out the RX23 with the bracket assembly attached. See Figure 5–13.

Figure 5–13 RX23 Mounting Bracket Screws



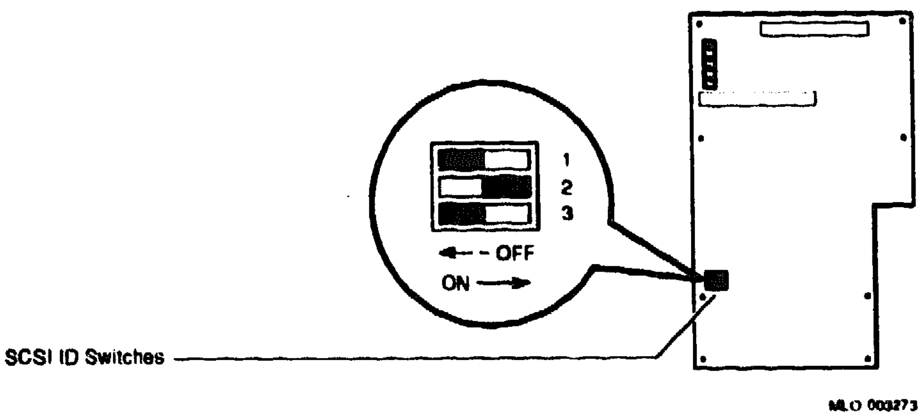
4. Remove the four screws securing the faulty RX23 to the mounting bracket.
5. Disconnect all power and signal cables connected to the FDI board.
6. Release the FDI board from the four standoffs, then lift it off the drive mounting panel. See Figure 5–14.

Figure 5–14 Removing the FDI Board



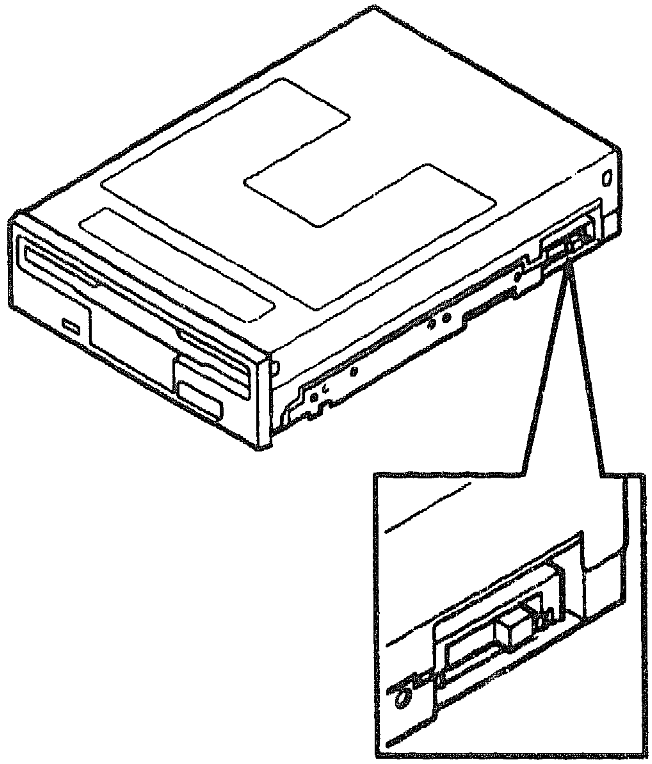
7. Set the switches on the new FDI board to the settings on the drive you removed. See Figure 5–15.

Figure 5–15 FDI Board SCSI Switch Locations



8. Set the select switch on the new drive to the setting on the drive you removed Figure 5–16.

Figure 5–16 RX23 Select Switch Position

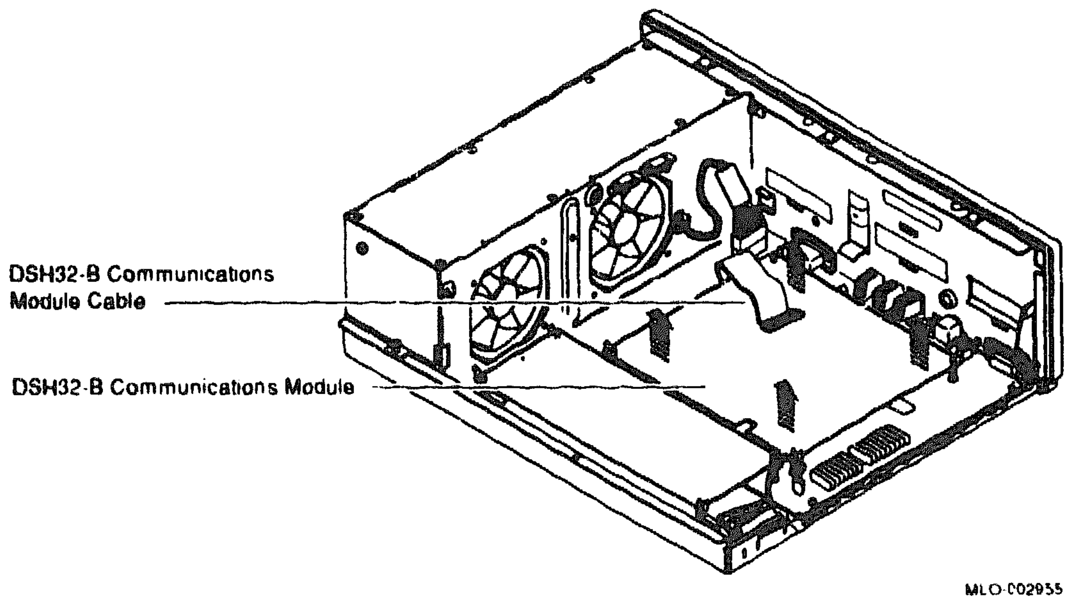


5.2.8 DSH32-B Communications Module Removal

Remove the DSH32-B communications module (if installed) as follows:

1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Remove the lower drive mounting panel. See Section 5.2.3.
4. Release the DSH32-B communications module from the four standoffs, then lift it off the system module. See Figure 5–17. Two connectors disconnect as you lift the module.

Figure 5–17 DSH32-B Communications Module Removal



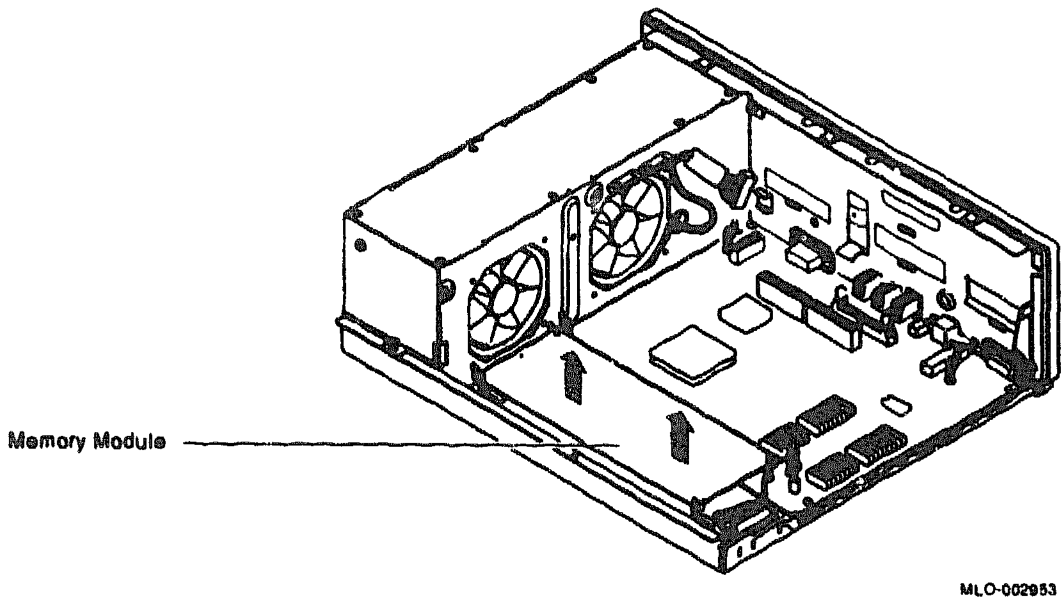
5.2.9 Memory Module Removal

There are three memory modules available: 4Mb, 12Mb, and 16Mb modules. The 4Mb and 12Mb modules are physically the same. The 16Mb module is slightly larger than the other two and it contains two additional connectors for connecting one of the other two memory modules piggyback style. This piggyback connection allows the 4Mb and 12Mb modules to increase the total memory in the system to 24Mb and 32Mb (including 4Mb on the system module). The removal procedure for all memory modules is the same.

Remove the memory modules as follows:

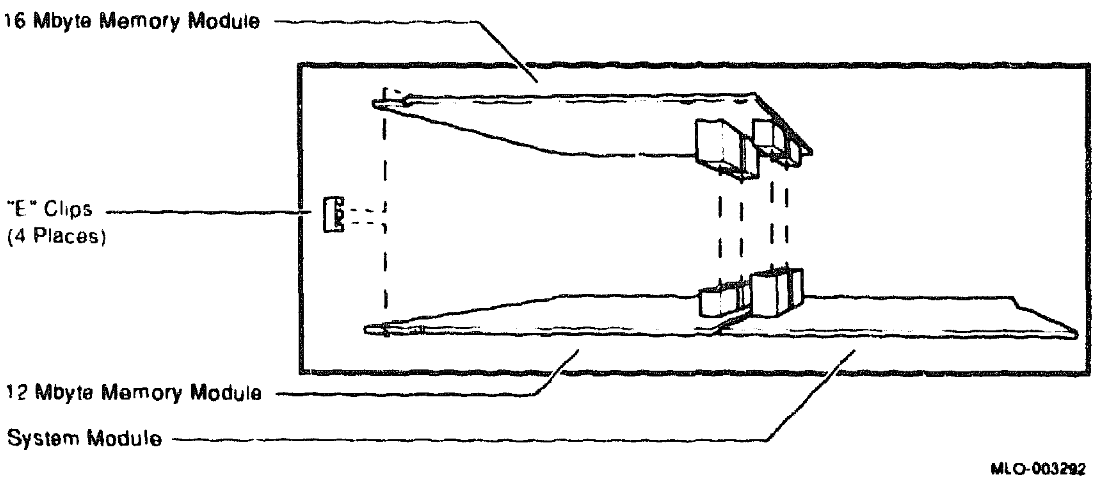
1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Remove the lower drive mounting panel. See Section 5.2.3.
4. **Release the memory module from the four standoffs, then lift the memory module off the system module. See Figure 5–18. Two connectors disconnect as you lift the module.**

Figure 5–18 Memory Module Removal



5. If the 16Mb memory module is installed and a 4Mb or 12Mb memory module is attached, separate the two modules and replace the faulty module (see Figure 5–19). Reassemble the two modules before reinstalling them onto the system module.

Figure 5–19 16Mb Memory Module



5.2.10 System Module Removal

Remove the system module as follows:

1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Remove the lower drive mounting panel. See Section 5.2.3.
4. Disconnect all cables from the back of the system box.
5. Release the DSH32-B communications module (if installed) from the four standoffs, then lift the DSH32-B communications module off the system module. See Figure 5–17. Two connectors disconnect as you lift the module.
6. Release the memory module from the four standoffs, then lift the memory module off the system module. See Figure 5–18. Two connectors disconnect as you lift the module.

7. Disconnect the power cable and the battery cable from the system module. See Figure 5–20.

NOTE

The power cable connector has a release tab which must be pressed to remove it from the system module.

8. Remove the eight screws from the system module. See Figure 5–20.
9. Remove the system module by carefully popping the two front corners off the two locating standoffs.

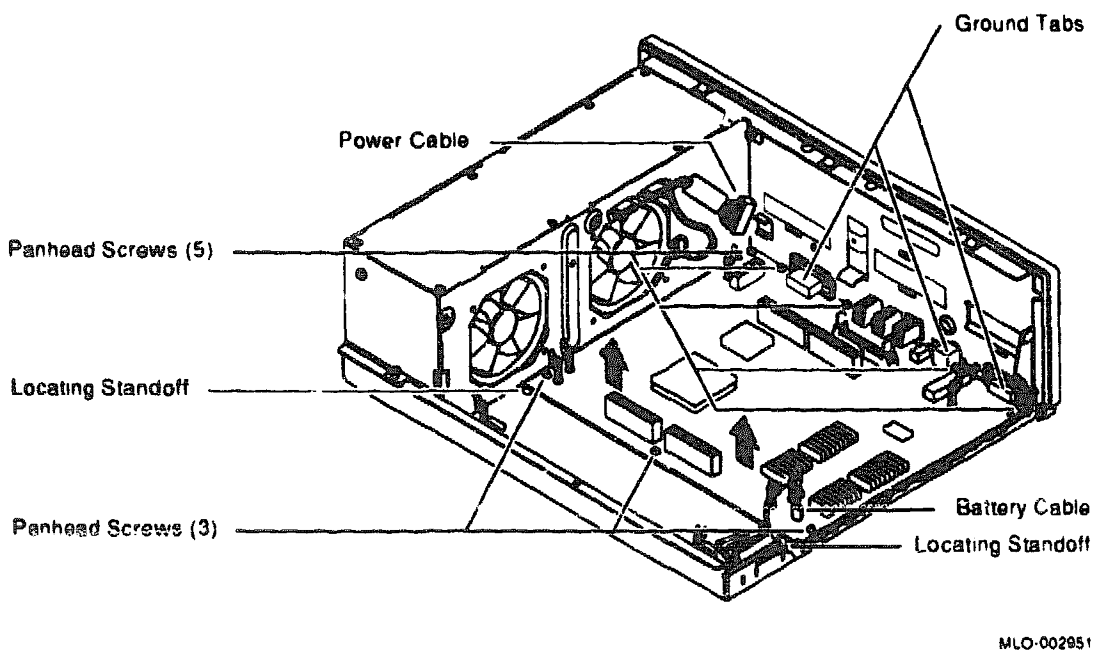
NOTE

When reinstalling the system module, install the connector end first through the openings in the rear of the box. Push the module back to load the connector ground tabs and then snap the module onto both locating standoffs. All screw holes will then be aligned.

CAUTION

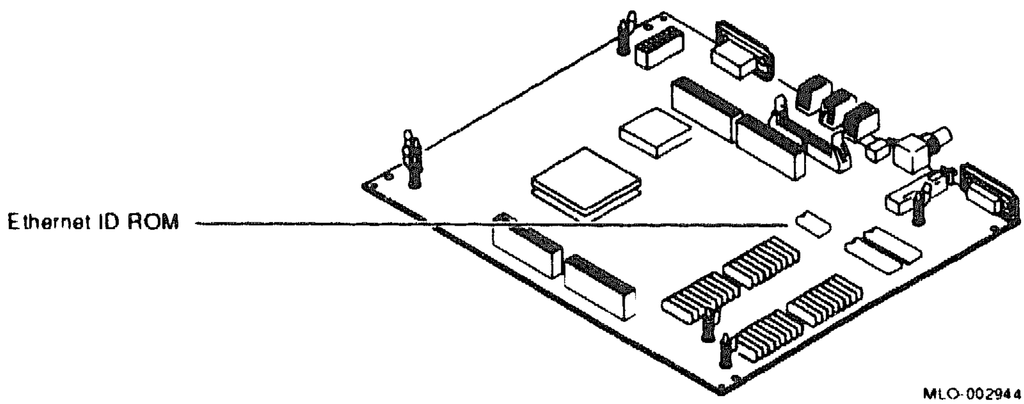
Be careful not to bend the pins on the ROM.

Figure 5–20 System Module Screw Locations



10. Remove the Ethernet ID ROM from the system module you removed (see Figure 5–21). Check the position of pin 1 (notched) on the ROM. Install the ID ROM on the new system module.
11. Set the baud rate jumper on the new system module to the setting on the system module you removed. See Figure 5–24.

Figure 5–21 Location of Ethernet ID ROM on System Module



5.2.11 Battery Pack Removal

Remove the battery pack as follows:

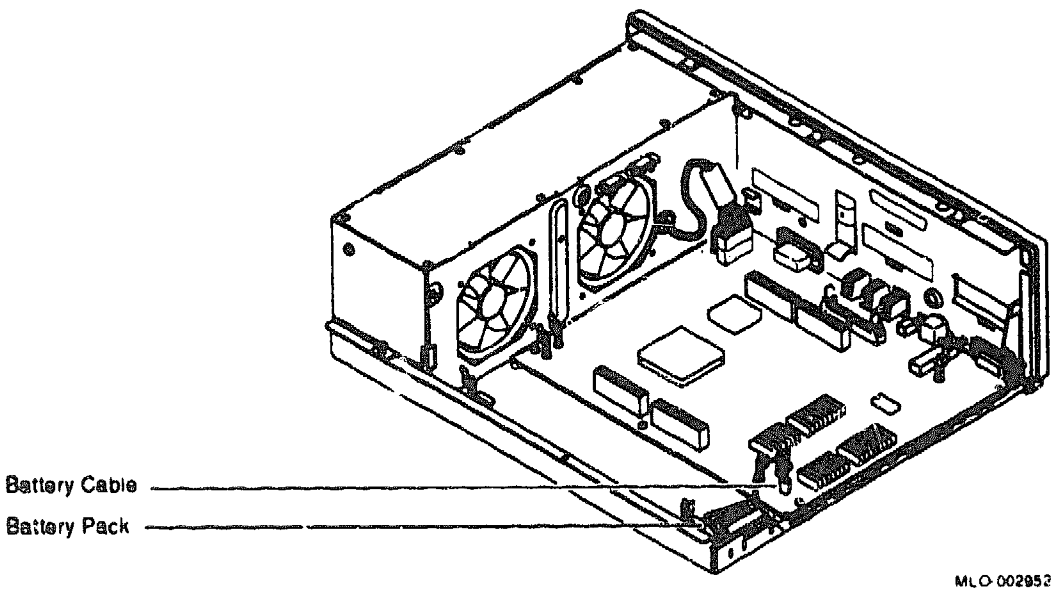
1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Remove the lower drive mounting panel. See Section 5.2.3.

4. Disconnect the battery cable from the system module. See Figure 5-22.
5. Remove the battery pack from its holder.

NOTE

A new battery needs a minimum of 17 hours of continuous power to fully charge the battery. If the battery's charge is low, you will see an error for the NVR (0000.0005) when you power up the system.

Figure 5-22 Battery Cable Location



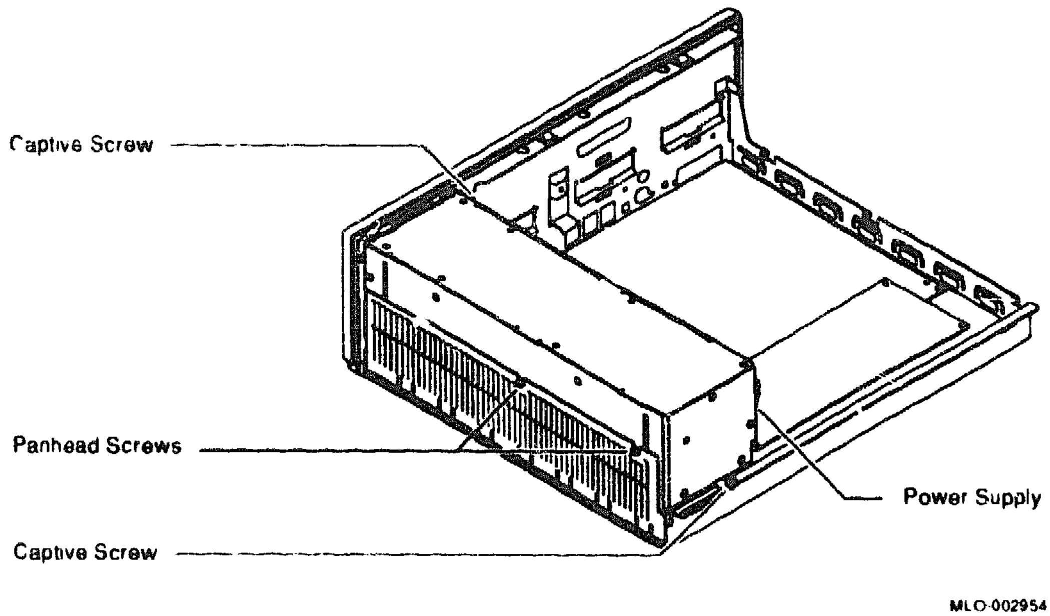
5.2.12 Power Supply Removal

Remove the power supply as follows:

1. Remove the system box cover. See Section 5.2.1.
2. Remove the upper drive mounting panel. See Section 5.2.2.
3. Remove the lower drive mounting panel. See Section 5.2.3.
4. Disconnect the power cable from the system module.

5. Loosen the two captive screws and the two panhead screws. See Figure 5–23.
6. Disconnect the two cables that supply power to the storage devices from the faulty power supply.
7. Lift the faulty power supply out of the system box.

Figure 5–23 Power Supply Screw Locations



5.3 Internal Memory Options

Three memory modules are available: a 4Mb memory module, a 12Mb memory module, and a 16Mb memory module. Only one memory module can be plugged into the system module unless the 16Mb memory module is installed. The 16Mb module has extra connectors which allows one of the 4Mb or 12Mb memory modules to be plugged into it piggyback style. With the 16Mb module plugged into the system module, a total of 24Mb or 32Mb memory is possible (4Mb on the system module and the 12Mb module piggybacked on the 16Mb module = 32Mb).

The procedure used to install memory modules is the reverse of the procedure listed in Section 5.2.9.

5.4 DSH32-B Communications Module Option

The DSH32-B communications module is in the system box and plugs directly into the system module. The DSH32-B communications module provides one eight line asynchronous port and one synchronous port.

The procedure used to install the DSH32-B communications module is the reverse of the procedure listed in Section 5.2.8.

5.5 Changing the Maximum Baud Rate of the MMJ Ports and the Modem Port

When the system is delivered, the maximum baud rate of MMJ ports 1, 2, 3, and MODEM is preset to 19.2 Kbaud. This baud rate can be changed to 19.8 Kbaud or 38.4 Kbaud by repositioning jumpers on the system module.

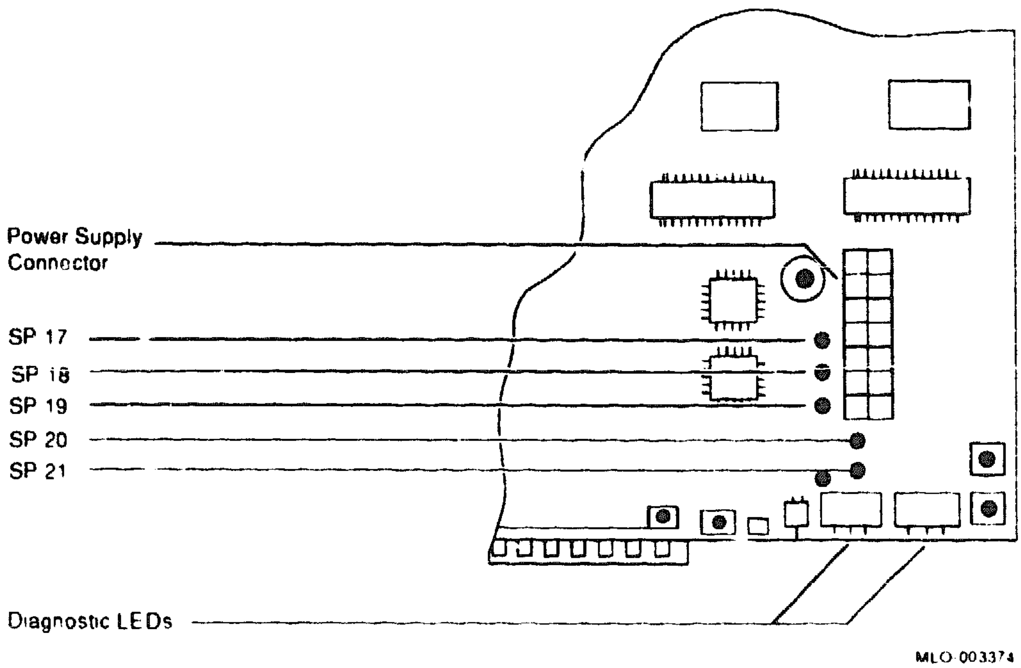
Table 5–3 shows the nodes on the system module that must be linked by jumpers to obtain the desired baud rate.

Figure 5–24 shows the position of the nodes on the system module.

Table 5–3 Jumper Settings for Serial Port Baud Rates

Baud Rate	Nodes Linked
19.2 Kbaud (default)	SP18 and SP19
19.8 Kbaud	SP18 and SP19 SP20 and SP21
38.4 Kbaud	SP17 and SP18

Figure 5–24 Location of Nodes on the System Module



6 Expansion Boxes

This chapter describes the three expansion boxes available for use with the MicroVAX 3100, the VAXserver 3100, and the InfoServer 100 systems. These three expansion boxes are the RZ55 disk drive, the RRD40 compact disc drive, and the TK50Z tape drive.

NOTE

SCSI IDs's of expansion boxes are determined by the SCSI ID switch positions on the device. To simplify explanations, the SCSI IDs mentioned in this chapter are the default values. They may have been changed by the customer depending on the system configuration.

Table 6-1 lists each expansion box and the section where it is described.

Table 6–1 Expansion Box Section Listing

Expansion Box	Section
RZ55 disk drive expansion box	6.1
RRD40 compact disc expansion box	6.2
TK50Z tape drive expansion box	6.3

6.1 RZ55 Expansion Box

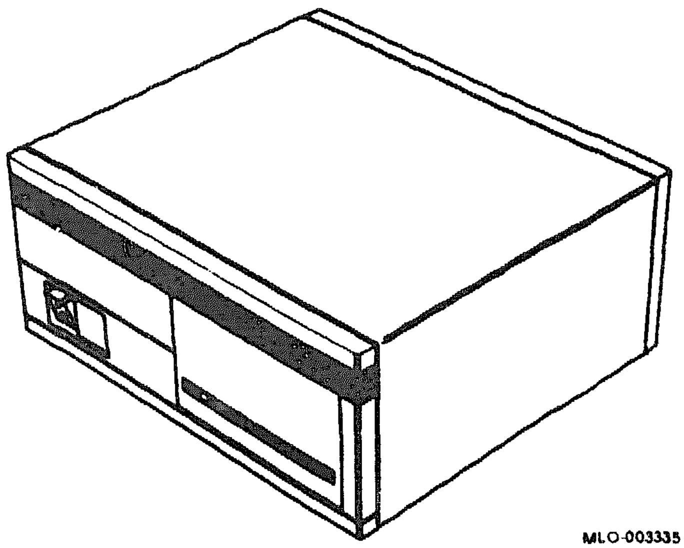
The RZ55 expansion box contains five FRUs:

- The RZ55 drive
- The RZ55 electronics module
- The SCSI ID switch module

- The power supply
- The resistor load board

Figure 6–1 shows the RZ55 expansion box.

Figure 6–1 RZ55 Expansion Box



CAUTION

The RZ55 expansion box must always be switched on or off before any other device so as not to disrupt the SCSI-B bus.

The RZ55 expansion box connects to the system box through the external SCSI port. The SCSI cable connects to either of the two ports on the back of the expansion box. However, the SCSI terminator must be installed on the unused connector unless another expansion box is daisy chained. If the SCSI port already has a box connected to it, use another cable to connect the RZ55 expansion box to the last box on the daisy chain. Be sure to move the terminator onto the unused connector on the back of the last expansion box in the daisy chain. Figure 6–2 and Figure 6–3 show how the RZ55 expansion box connects to the system box.

Figure 6–2 RZ55 Expansion Box Connection

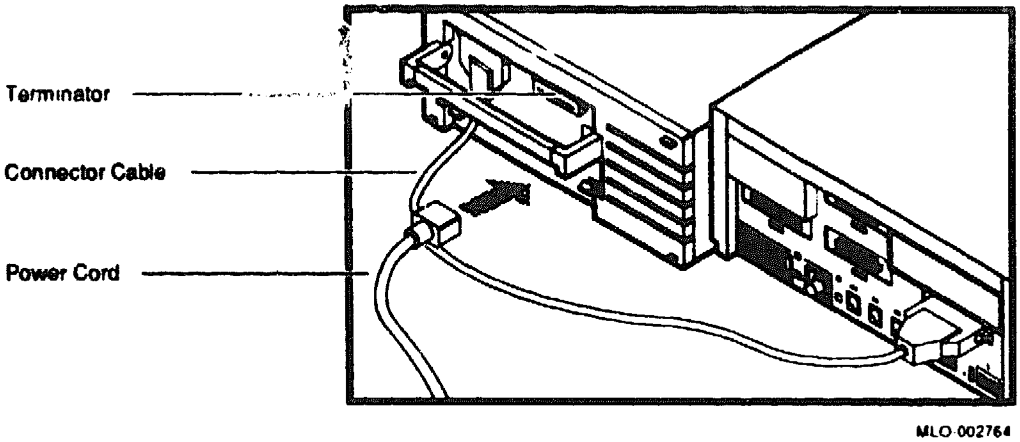
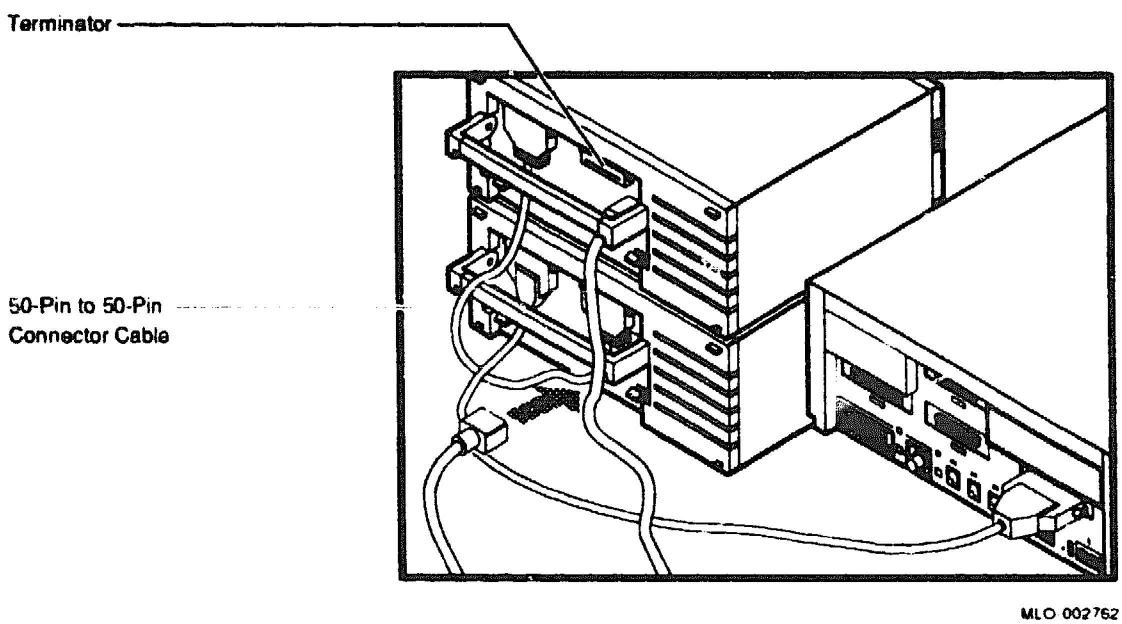


Figure 6–3 Two Daisy Chained RZ55 Expansion Boxes



6.1.1 Troubleshooting the RZ55 Disk Drive Expansion Box

To troubleshoot the RZ55 disk in the expansion box, use the self-test and system exerciser diagnostics in the system box. See Section 2.12.3 if you are not familiar with testing the devices on the SCSI bus.

Self-test results for the RZ55 disk drive should contain 00000001 in the SCSI address ID location set by the switches on the back of the expansion box (should be ID 1). A code of FFFFFF05 for the RZ55 indicates that the device is not installed, not powered up, not connected to the SCSI port correctly, or faulty. A code of FFFFFFFF indicates that the device was not tested because of an SCSI bus controller error. Any code other than those previously listed indicates an error with the disk drive at that address ID location, a cabling problem, or an error with the SCSI bus controller on the system module. An additional RZ55 drive expansion box can be installed at address ID 2 or 3 if no internal drives connect to these SCSI address IDs on the external SCSI bus.

When running the system exerciser in Field Service mode, the code for the disk drive shows that it is writable and that no errors are present (1200.0001 for an SCSI ID of 1). Any error code other than those previously listed indicates a possible disk error, but never rule out the possibility of an error on the SCSI bus controller itself.

If the tests indicate an error on the RZ55, perform the following steps:

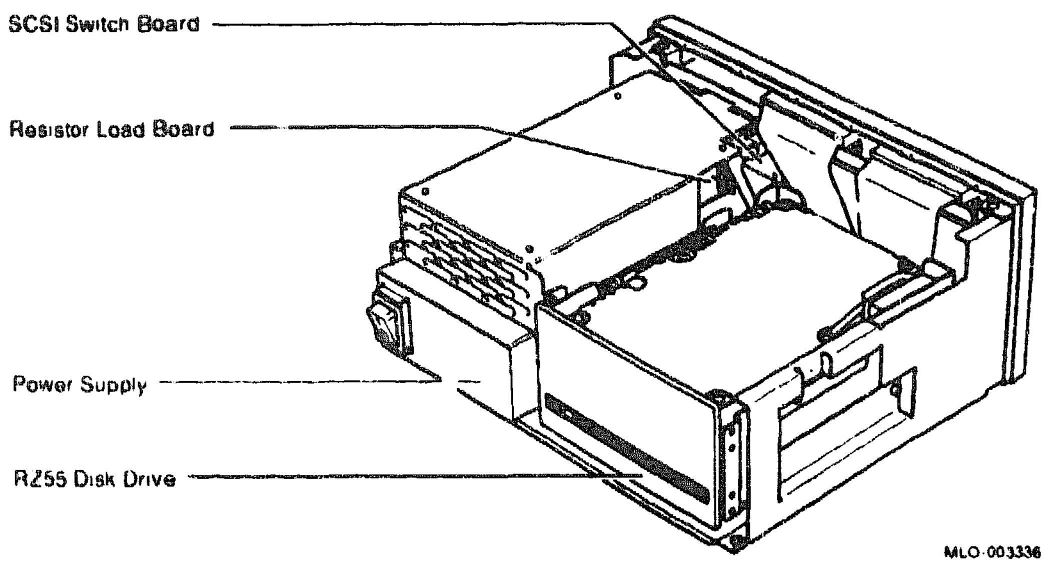
1. Make sure the expansion box has power and is switched on.
2. Make sure the SCSI port cable connects correctly to the external SCSI port on the system box, or to the previous expansion box, and to the back of the RZ55 expansion box.
3. Make sure the SCSI terminator is installed on the unused connector on the back of the box or that the cable is secured to the next daisy-chained box.
4. Run the tests again.
5. If the problem returns, disconnect the RZ55 expansion box from the daisy chain or from the external SCSI port if no other boxes are connected. Install the SCSI terminator on the external SCSI port, make sure the last expansion box is terminated correctly, and run self-test (TEST 6).
6. If the status code is not FFFFFF05 for the address ID of the RZ55 expansion box (normally address ID 1), check the SCSI address IDs of all drives on the bus for correct settings. If the address IDs are set correctly, replace the system module.

7. If the status code is FFFFFF05, check the address ID switch on the back of the RZ55 expansion box to make sure it is set correctly. See Figure 6–13 for proper SCSI ID switch settings.
8. If the address ID and drive select jumpers are set correctly, a fault in the RZ55 expansion box exists.
9. Remove the cover of the expansion box and check the internal cabling for good connections.
10. Power up the expansion box and listen for the fan and the drive to spin up. If the fan does not spin or the drive does not hum, replace the power supply, reconnect the box to the SCSI port, and retest.
11. If the power supply operates normally, replace the RZ55 electronics module, reconnect the box to the SCSI port, and retest.
12. If replacing the RZ55 electronics module did not fix the problem, replace the whole RZ55 drive, reconnect the box to the SCSI port, and retest.
13. If replacing the RZ55 drive did not fix the problem, replace the SCSI switch module, reconnect the box to the SCSI port, and retest.
14. If replacing the SCSI ID switch module did not fix the problem, replace the resistor load board, reconnect the box to the SCSI port, and retest.
15. If a problem still exists, check the internal SCSI cable's connector for damaged pins or cut wires. Check the external SCSI cable for damaged connector pins or cut wires. Then replace the system module in the system box if the cables appear normal.

6.1.2 RZ55 Expansion Box FRU Locations

Figure 6–4 shows the locations of the FRUs in the RZ55 expansion box.

Figure 6–4 RZ55 Expansion Box FRU Locations



6.1.3 RZ55 Expansion Box FRU Removal and Replacement

This section describes the removal and replacement procedures for the FRUs in the RZ55 expansion box. Refer to Table 6–2 to find the name of the FRU that needs replacing, then go to the section listed beside the FRU. Follow the steps in the section to remove the FRU and reverse the procedures to replace the FRU.

CAUTION

Wear a static wrist strap and use a static mat when replacing an FRU.

Table 6–2 RZ55 Expansion Box FRU Section Listings

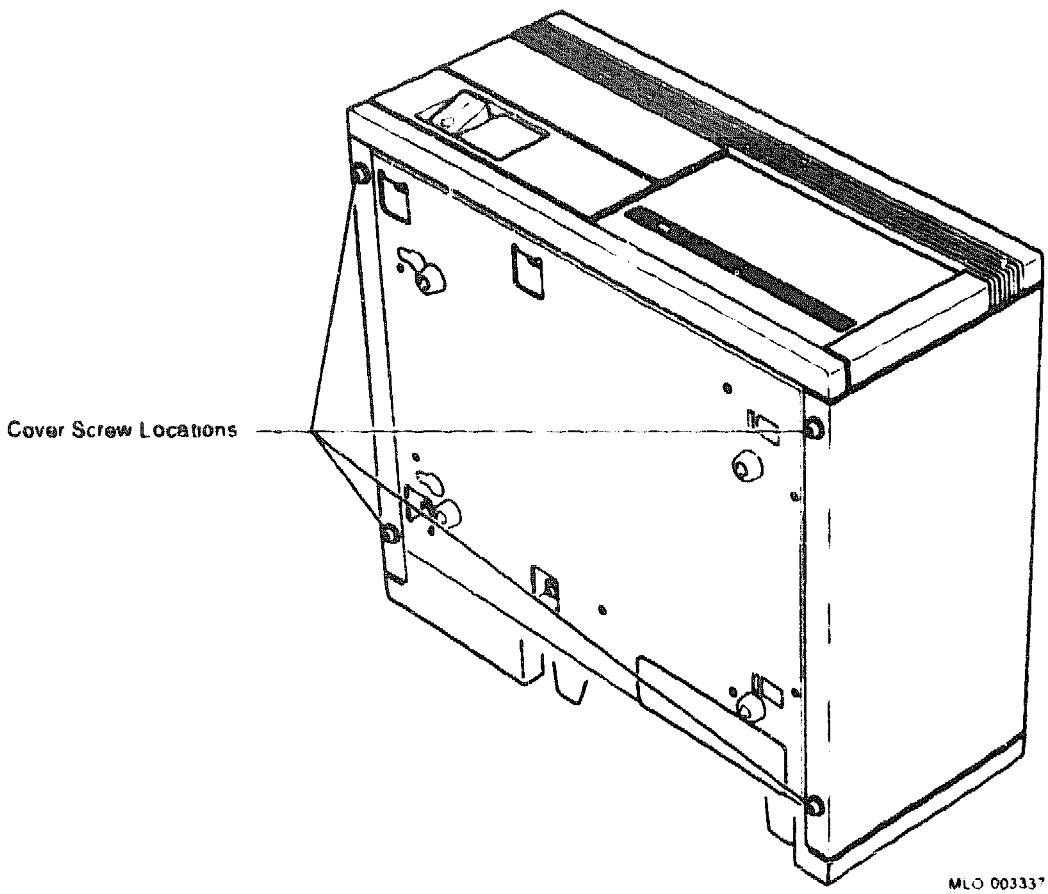
FRU	Section
RZ55 disk drive and electronics module	6.1.3.1
SCSI ID switch module	6.1.3.2
Power supply	6.1.3.3
Resistor load board	6.1.3.4

6.1.3.1 RZ55 Disk Drive Removal from Expansion Box

The following section describes the removal and replacement procedure for the RZ55 and its electronics module. If you have already replaced the drive's electronics module and a problem still exists, you must replace the complete drive instead of replacing just the following electronics module as described. Remove the complete drive as follows:

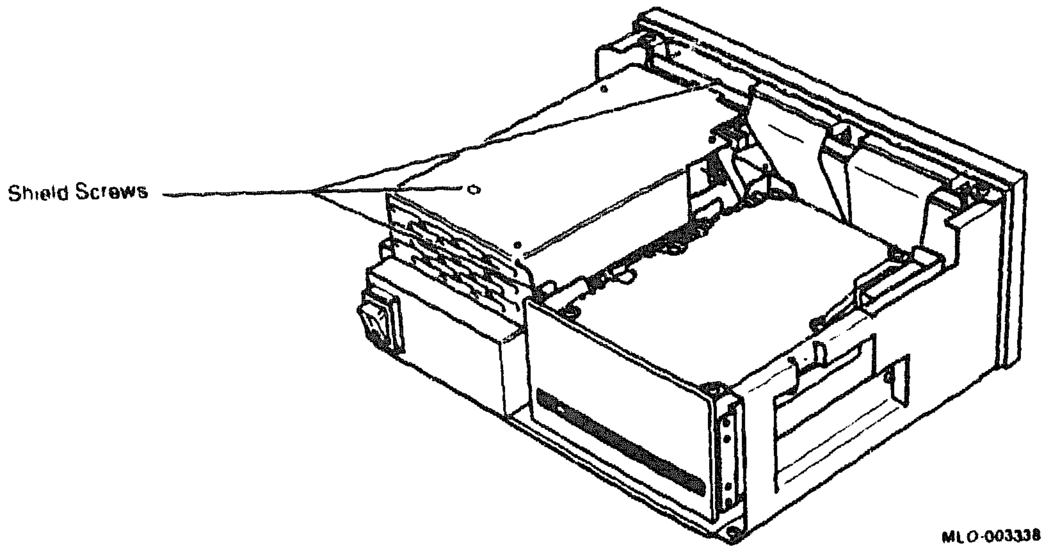
1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–5.

Figure 6–5 RZ55 Expansion Box Cover Screws



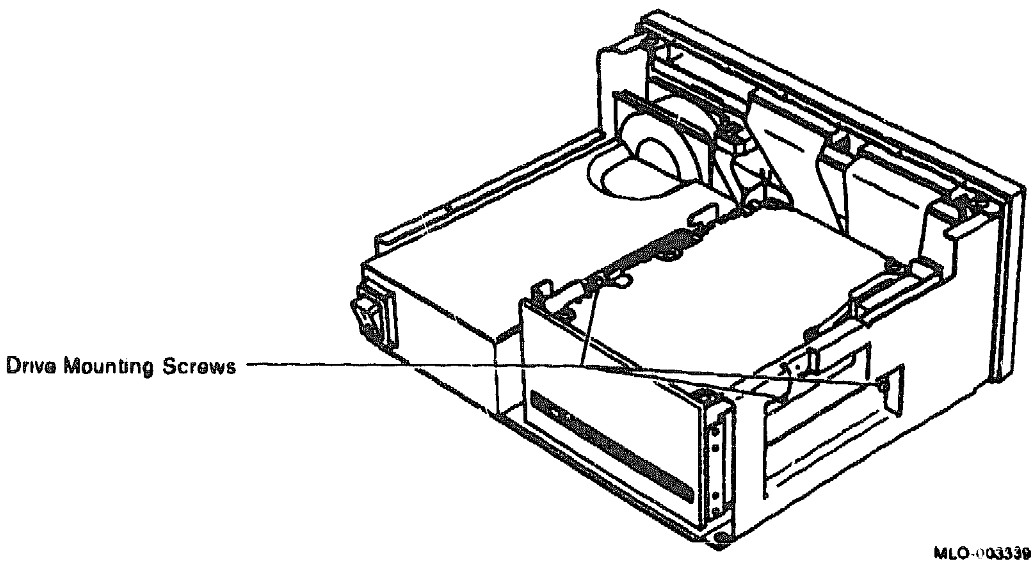
3. Remove the three screws. See Figure 6-6.
4. Lift the shield up, disconnect the power cable from the resistor load board, and remove the shield from the expansion box.

Figure 6-6 RZ55 Expansion Box Shield Screws



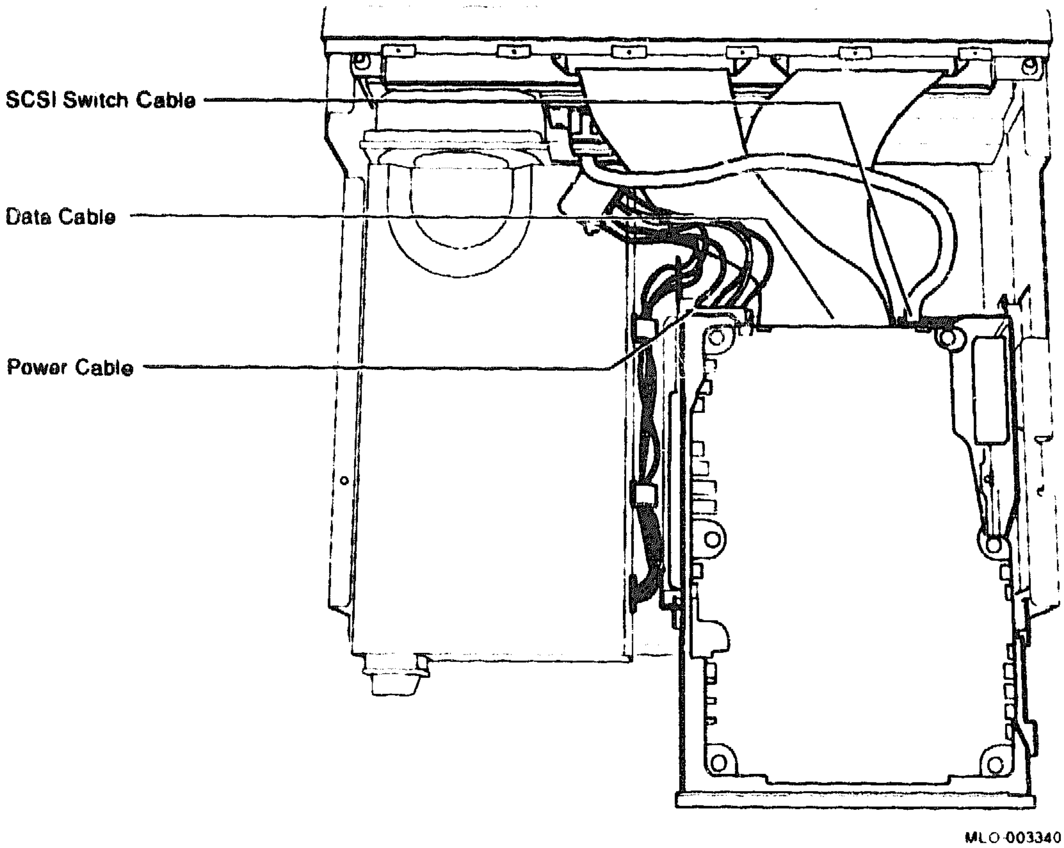
5. Remove the three drive mounting screws. See Figure 6–7.

Figure 6–7 RZ55 Expansion Box Drive Mounting Screws



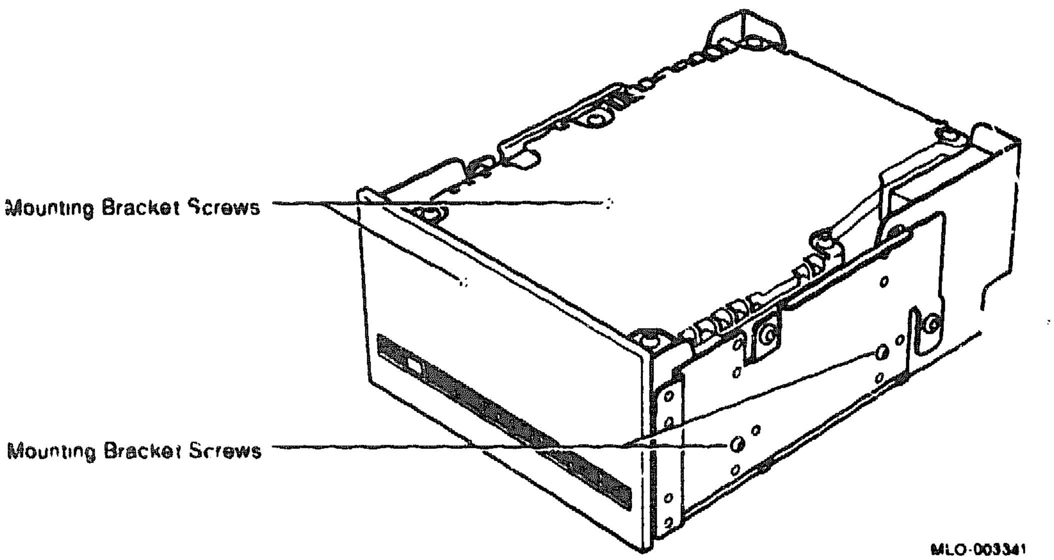
6. Slide the drive out halfway and disconnect the data cable, the SCSI switch cable, and the power cable from the back of the drive, then slide the drive all the way out of the box. See Figure 6–8.

Figure 6–8 RZ55 Expansion Box Drive Cables



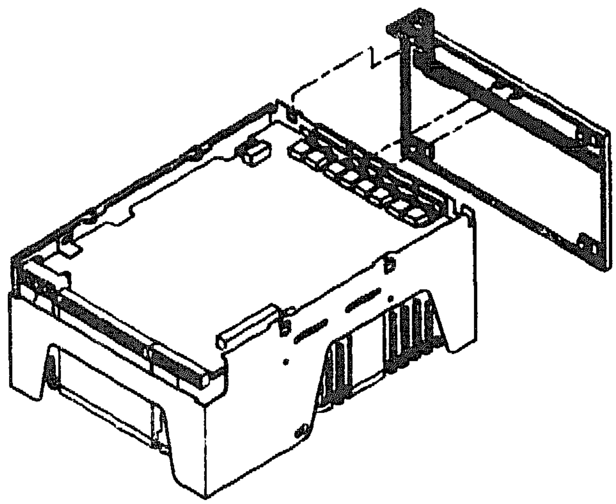
7. Remove the four screws and the mounting brackets from the drive. See Figure 6–9.

Figure 6–9 RZ55 Mounting Bracket Screws



8. Position the drive as in Figure 6–10.

Figure 6–10 RZ55 Bezel Removal



MLO-003274

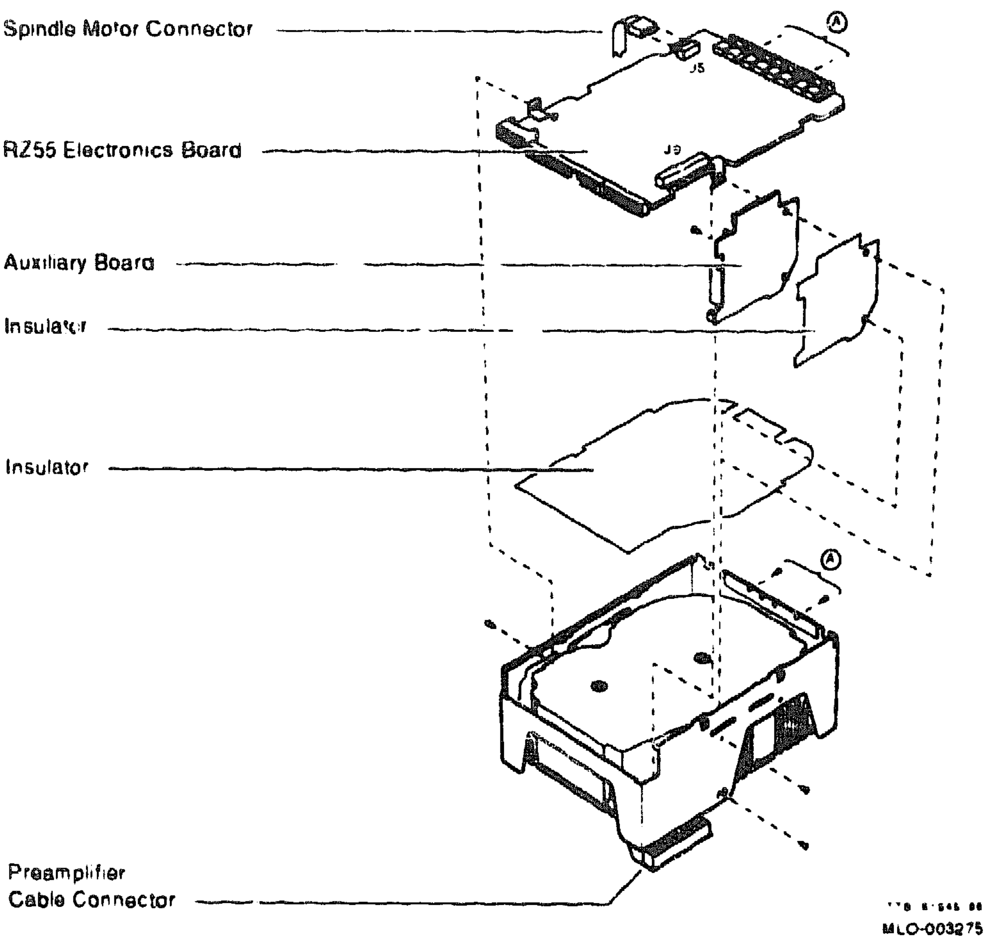
9. If you have already replaced the electronics module on the drive, stop here and replace the whole drive. Otherwise, replace the electronics module as follows:

10. Carefully apply outward pressure to the bezel with your thumbs until the two bezel locking pins clear the holes in the frame. Note that the bezel must flex (about 1/8 inch) to clear the pins.

11. While the bezel is clear of the locking pins, slide it upward until movement stops (about 3/8 inch). Then remove the bezel from the drive.

12. Remove the three screws. See Figure 6–11.

Figure 6–11 Drive Module Removal



13. Unplug the spindle motor connector at J5.
14. Unplug the preamplifier cable connector at the auxiliary board. When setting the drive back on the work surface, place a support under the drive to protect the loose preamplifier cable and connector.
15. Lift the drive module and the auxiliary board up and out of the drive.
16. Remove the screw and speednut holding the drive module.
17. Unplug the auxiliary board from J9 on the drive module.
18. Install the new module by reversing the previous procedure.

19. The jumpers on the new module should not have to be set. Check the new module to make sure that the jumpers are set to the same position as on the old module you just removed and set them if necessary.

20. Reinstall the RZ55 into the expansion box.

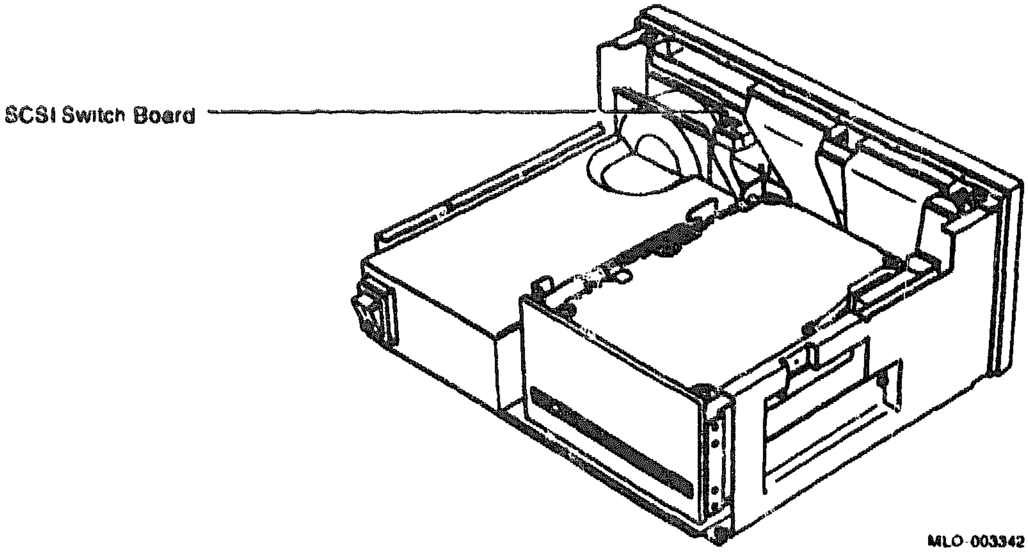
6.1.3.2 RZ55 Expansion Box SCSI ID Switchboard

The SCSI ID switchboard is on the inside back wall of the RZ55 expansion box. It contains two switch packs. Only one is on the RZ55 expansion box, and connects to the smaller connector on the RZ55 drive by way of a cable.

The following procedure describes how to remove the switchboard:

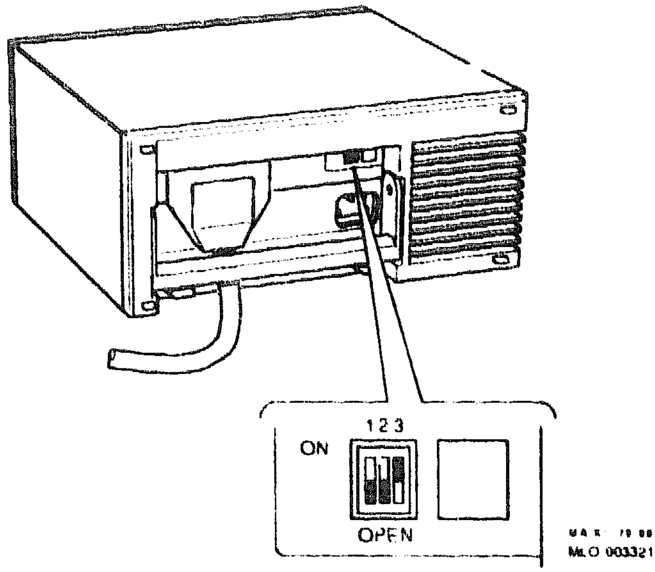
1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–5.
3. Remove the three screws. See Figure 6–6.
4. Lift the shield up, disconnect the power cable, and remove the shield (with the resistor load board) from the expansion box.
5. Disconnect the cable from the SCSI ID switchboard. See Figure 6–12.

Figure 6–12 RZ55 Expansion Box SCSI ID Switchboard



6. Remove the two screws from the board and remove the board from the expansion box.
7. Set the switch settings on the new SCSI ID switchboard to the same position as on the old board you just removed.
8. Reverse this procedure to install the switchboard. Figure 6–13 shows the default SCSI ID switch settings (ID=1).

Figure 6–13 RZ55 Expansion Box SCSI ID Switch Setting



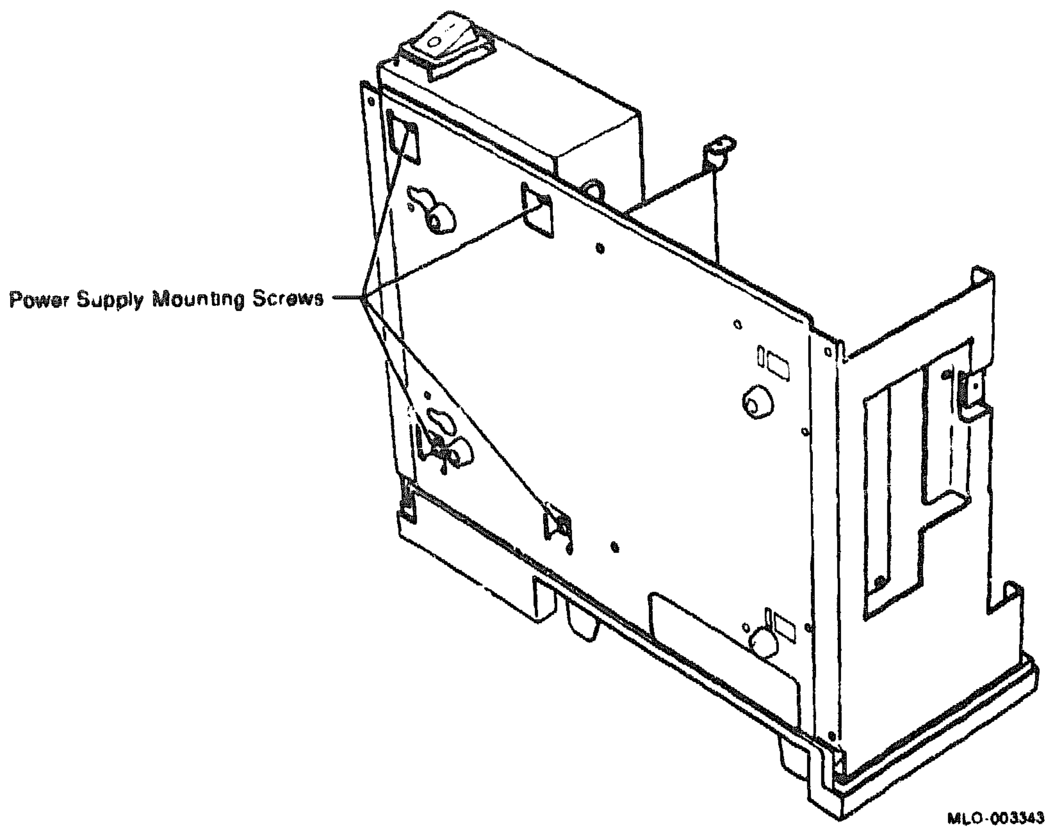
6.1.3.3 RZ55 Expansion Box Power Supply Removal

The following procedure describes how to remove the RZ55 expansion box power supply:

1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–5.
3. Remove the three shield screws. See Figure 6–6.
4. Lift the shield up, disconnect the power cable from the resistor load board, and remove the shield (with the resistor load board) from the expansion box.
5. Remove the three drive mounting screws. See Figure 6–7.
6. Slide the drive out part way and disconnect the power cable, the SCSI switch cable, and the data cable from the drive.
7. Remove the drive from the box.
8. Tip the RZ55 expansion box on its side, and remove the four power supply screws. See Figure 6–14.

9. Replace the power supply by reversing the previous procedure.

Figure 6–14 RZ55 Expansion Box Power Supply Screws



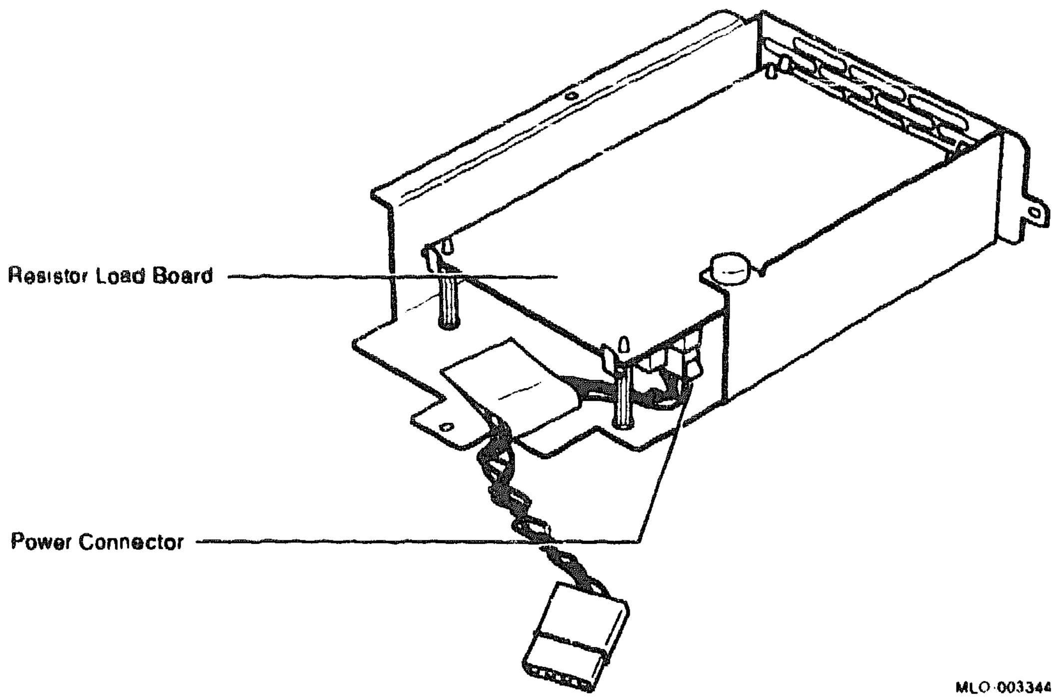
6.1.3.4 Resistor Load Board Removal

The following procedure describes how to remove the RZ55 expansion box resistor load board:

1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–5.
3. Remove the three shield screws. See Figure 6–6.
4. Lift the shield up, disconnect the power cable from the resistor load board, and remove the shield (with the resistor load board) from the expansion box.

5. Remove the resistor load board from the standoffs on the shield. See Figure 6–15.

Figure 6–15 RZ55 Expansion Box Resistor Load Board



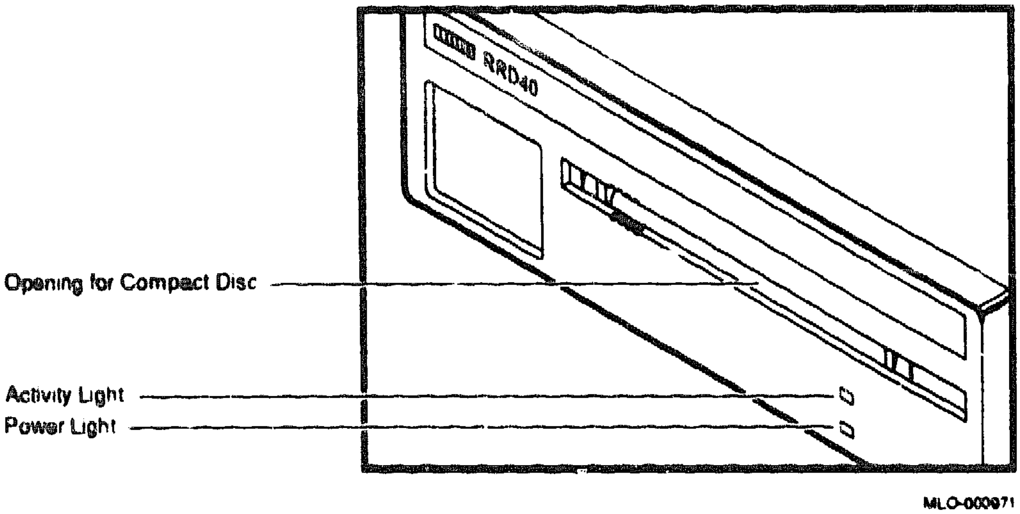
6. Replace the resistor load board by reversing the previous procedure.

6.2 RRD40 Compact Disc Expansion Box

The RRD40 compact disc expansion box is one FRU. There are no replaceable components inside the box. When you detect an error in the RRD40 compact disc expansion box, replace the whole box as one FRU.

The RRD40 compact disc expansion box connects to the system box through the external SCSI port. The SCSI cable connects to either of the two ports on the back of the expansion box. Install the SCSI terminator on the unused connector, unless another expansion box is daisy chained. If the SCSI port already has a box connected to it, use another cable to connect the RRD40 expansion box to the last box on the daisy chain. Be sure to move the terminator onto the unused connector on the back of the last expansion box in the daisy chain.

Figure 6–16 RRD40 Compact Disc Expansion Box



6.2.1 RRD40 Compact Disc Expansion Box Troubleshooting

To troubleshoot the RRD40 compact disc expansion box, use the self-test and system exerciser diagnostics in the system box. See Section 2.12 if you are not familiar with testing the devices on the SCSI bus.

Self-test results for the RRD40 box should contain 05000001 in the SCSI address ID location set by the switches on the back of the expansion box (should be ID 4). A code of FFFFFF05 for the RRD40 box indicates that the box is not installed, not powered up, not connected to the external SCSI port correctly, or faulty. A code of FFFFFFFF indicates that the device was not tested because of a SCSI bus controller error. Any code other than those previously listed indicates an error with the RRD40 compact disc expansion box at that address ID location (should be ID 4), a cabling problem, or an error with the SCSI bus controller on the system module. An additional RRD40 expansion box can be connected at address ID 1 or 0 if no other external boxes are connected to these SCSI address IDs on the external SCSI bus.

When running the system exerciser in Field Service mode, the code for the RRD40 compact disc expansion box shows that the disc is removable, but not writable, and that no errors are present (4100.0001 for SCSI ID of 4, 0100.0001 for SCSI ID of 0, and 1100.0001 for SCSI ID of 1). Any error code other than those previously listed probably indicates an error on the RRD40 box, but never rule out the possibility of an error on the SCSI bus controller itself.

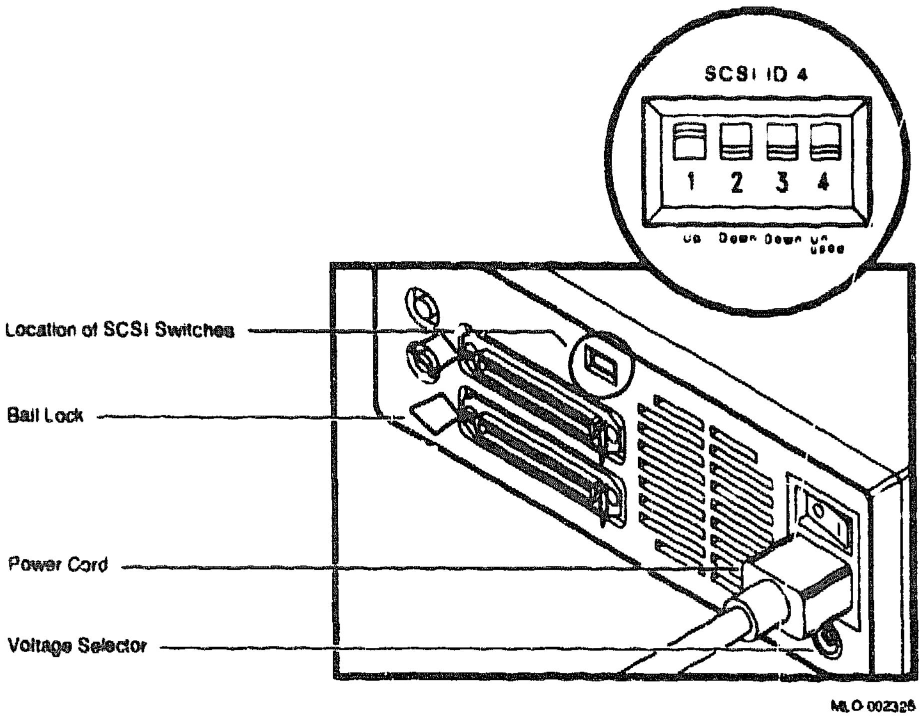
If the tests indicate an error on the RRD40 compact disc expansion box, perform the following steps:

1. Make sure the expansion box has power and is switched on.
2. Make sure the SCSI cable connects correctly to the external SCSI port, or to the previous expansion box, and to the back of the RRD40 expansion box.
3. Make sure the SCSI terminator connects to the unused connector on the back of the box or that the cable is secured to the next daisy-chained box.
4. Run the tests again.
5. If the problem returns, disconnect the RRD40 expansion box from the daisy chain or from the SCSI port if no other boxes are connected. Install the SCSI terminator on the external SCSI port, and make sure the last expansion box is terminated correctly. Run self-test (TEST 6).
6. If the status code is not FFFFFF05 for the address ID of the RRD40 expansion box (normally address ID 4), check the SCSI address IDs of all drives on the bus for proper settings. If the address IDs are set correctly, replace the system module.
7. If the status code is FFFFFF05, check the address ID switch on the back of the RRD40 expansion box to make sure it is set correctly. See Figure 6–17 for proper SCSI ID switch settings.
8. If the address ID is set correctly, a fault in the RRD40 expansion box or the SCSI cabling exists. Check the cabling for proper connections, terminations, and damaged pins. If the cabling is good, replace the RRD40 expansion box.
9. If a problem still exists, replace the system module in the system box.

6.2.2 RRD40 Expansion Box Removal and Replacement

This section describes the removal and replacement procedure for the RRD40 compact disc expansion box. The RRD40 expansion box is an FRU. To remove the RRD40 expansion box, set the power switches on the system unit and all peripherals, terminals, and expansion boxes to the OFF (0) position, then disconnecting the cables and terminator (if installed) on the back of the box. Replace the RRD40 expansion box by reconnecting the cables and terminator (if installed) on the back of the box. Then set the SCSI address ID to the same as on the box you removed. Figure 6–17 shows the default switch settings (ID=4). To test the box, switch on the power and run self-test (TEST 6) from the system box.

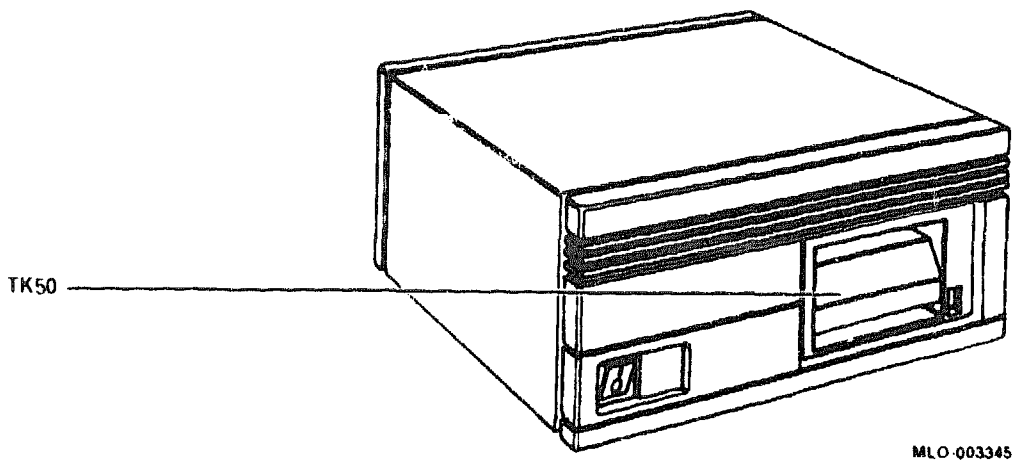
Figure 6–17 RRD40 Expansion Box SCSI Address ID Setting



6.3 TK50Z Expansion Box

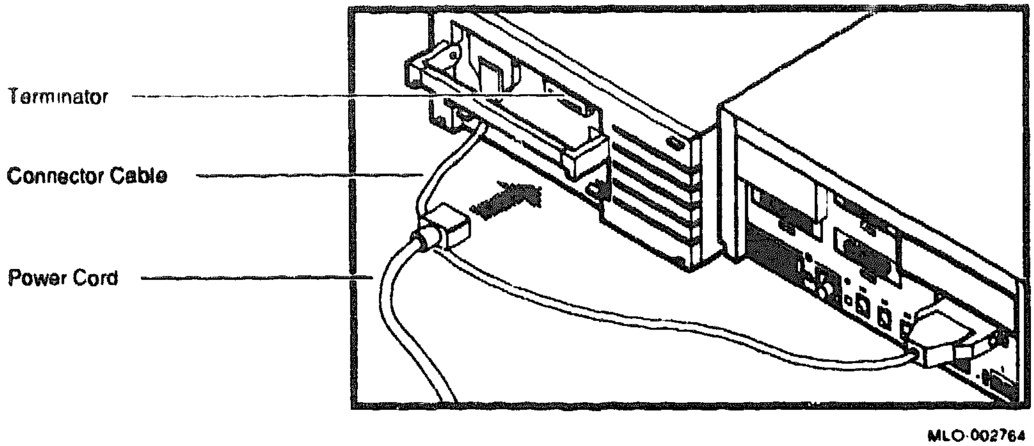
The TK50Z-GA expansion box contains five FRUs: the TK50 tape drive, a TZK50 controller board, a power supply, an SCSI ID switchboard, and a resistor load board (to regulate the power supply). Figure 6-18 shows the TK50Z expansion box.

Figure 6-18 TK50Z Expansion Box



The TK50Z expansion box connects to the system box through the externa SCSI port. The SCSI cable connects to either of the two ports on the back of the expansion box. The SCSI terminator must be installed on the unused connector unless another expansion box is daisy chained. If the external SCSI port already has a box connected to it, you must use another cable to connect the TK50Z expansion box to the last box on the daisy chain. Be sure to move the terminator onto the unused connector or the back of the last expansion box in the daisy chain. Figure 6-19 shows how the TK50Z expansion box connects to the system box.

Figure 6–19 TK50Z Expansion Box Connection



6.3.1 Troubleshooting the TK50Z Expansion Box

To troubleshoot the TK50Z expansion box, use the self-test and the system exerciser diagnostics in the system box. See Section 2.12.3 if you are not familiar with testing the devices on the SCSI bus.

Self-test results for the TK50Z expansion box should contain 01000001 in the SCSI address ID location of the box (normally address ID 5). The SCSI address ID is set by the switches on the back of the expansion box. A code of FFFFFF05 for the TK50Z expansion box address ID indicates that it is not installed, not powered up, not connected to the external SCSI port correctly, or faulty. A code of FFFFFFFF indicates that the device was not tested because of an SCSI bus controller error. Any code other than those previously listed indicates an error with the TK50Z expansion box at that address ID location, a cabling problem, or an error with the SCSI bus controller on the system module.

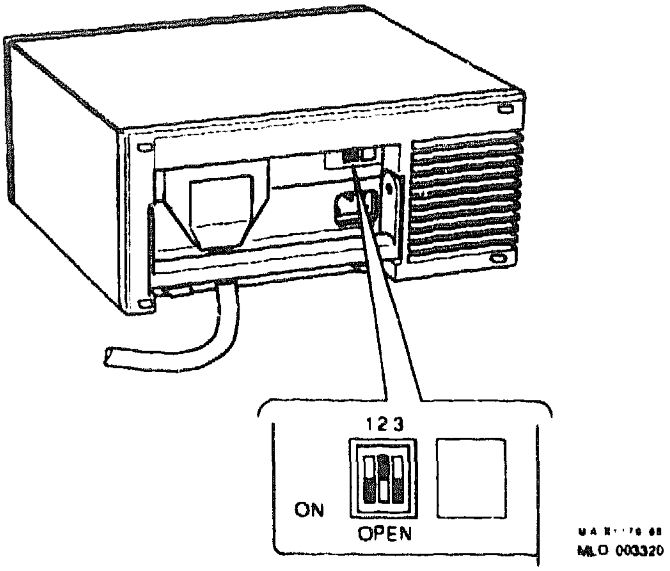
When running the system exerciser in Field Service mode, the code for the TK50Z expansion box shows that it is removable, but not writable during the first pass (5100.0001 for SCSI ID of 5). During the second and subsequent passes, the code should indicate that it is removable and writable (5300.0001) as long as the special-keyed diagnostic tape is correctly loaded. If the special-keyed tape is not loaded, the 5100.0001 code indicates no errors. Any error code other than those previously listed probably indicates an error on the TK50Z expansion box, but never rule out the possibility of an error on the SCSI bus controller itself.

If the test results indicate a problem in the TK50Z expansion box, the problem could be the TK50 tape drive, the TZK50 controller board, the power supply, the system module in the system box, the SCSI ID switchboard, or the SCSI cabling.

The following procedure describes how to troubleshoot the TK50Z expansion box:

1. Make sure the expansion box has power and is switched on.
2. Make sure the SCSI port cable connects correctly to the external SCSI port, or to the previous expansion box, and to the back of the TK50Z expansion box.
3. Make sure the SCSI terminator is installed on the unused connector on the back of the box or that the cable is secured to the next daisy-chained box.
4. Run the tests again.
5. If the problem returns, disconnect the TK50Z expansion box from the daisy chain or from the external SCSI port if no other boxes are connected. If no other expansion boxes are connected to the system unit, install the SCSI terminator on the external SCSI port. Otherwise, make sure the last expansion box is correctly terminated. Run self-test (TEST 6).
6. If the status code is not FFFFFF05 for the address ID of the TK50Z expansion box (normally address ID 5), check the SCSI address IDs of all drives on the SCSI bus for the correct settings. If the address IDs are set correctly, replace the system module.
7. If the status code is FFFFFF05, check the SCSI address ID switch settings on the back of the TK50Z expansion box to make sure they are set correctly. See Figure 6–20 for proper SCSI switch settings.
8. If the SCSI address ID is set correctly (ID=5), there is a fault in the TK50Z expansion box. Troubleshoot the TK50Z expansion box using the box's internal self-test. See Section 6.3.1.1.

Figure 6–20 TK50Z-GA SCSI Address ID Switch Settings



6.3.1.1 Troubleshooting Inside the TK50Z Expansion Box

The TK50 tape drive and the TZK50 controller board perform an internal self-test every time the tape expansion box is powered up. To do an in-depth self-test on the TK50 tape drive and the TZK50 controller board, perform the following procedure. Do each step indicated until you find and fix the problem.

The following procedure describes how to troubleshoot inside the TK50Z expansion box:

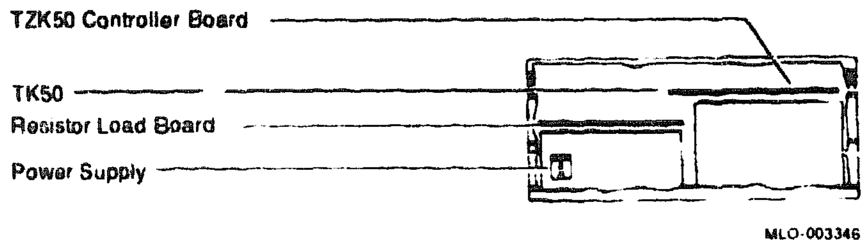
1. Remove the TK50Z expansion box cover.
2. Check all cables to make sure they connect correctly. Remove the shield to check the cables on the back of the drive. Note that two power cables connect to the resistor load board.
3. Plug in the power cord and switch on power to the expansion box.
4. If the LED on the TZK50 controller board and on the TK50 tape drive does not light when power is first turned on or the fan does not turn, replace the power supply.
5. Watch the red light on the TK50 tape drive. It should shut off 5 to 6 seconds after power-up if no tape is installed. If it starts flashing, replace the TK50 tape drive. If a tape is installed, the red light stays on.

6. Look at the LED on the TZK50 controller board. It turns on at power-up for 2 seconds, then turns off. It must stay off once it turns off. If it does not stay off, replace the TZK50 controller board.
7. Insert and load a blank CompacTape cartridge into the tape drive. Do not use a tape cartridge that contains good data, because the next few steps will erase the data.
8. Switch off power to the expansion box.
9. Switch on the power switch.
10. Wait about 1 minute for the test to finish. If the LED on the TZK50 controller board starts flashing during or at the end of the test, replace the TK50 tape drive. If the LED does not flash, replace the TZK50 controller board. If the LED is off, the TZK50 controller board and the TK50 tape drive are operating correctly. Note that the LED comes on again at the end of the test for about 2 seconds to indicate that the testing cycle completed and is starting over again. The test will continue to cycle until power is switched off and the P5 diagnostic jumper is removed.
11. Replace the faulty FRU component, if any, and retest.
12. Set up the jumpers on the TZK50 controller board for normal operation. Spare jumpers must be stored across P5 and one of the spare posts.

6.3.2 TK50Z Expansion Box FRU Locations

Figure 6–21 shows the locations of the FRUs in the TK50Z expansion box.

Figure 6–21 TK50Z Expansion Box FRU Locations



6.3.3 TK50Z Expansion Box FRU Removal and Replacement

This section describes the removal and replacement procedures for the FRUs in the TK50Z expansion box. Refer to Table 6–3 to find the name of the FRU that needs replacing, then go to the section listed beside the FRU. Follow the steps in the section to remove the FRU and reverse the procedures to replace the FRU.

CAUTION

Wear a static wrist strap and use a static mat when replacing an FRU.

Table 6–3 TK50Z Expansion Box FRU Section Listings

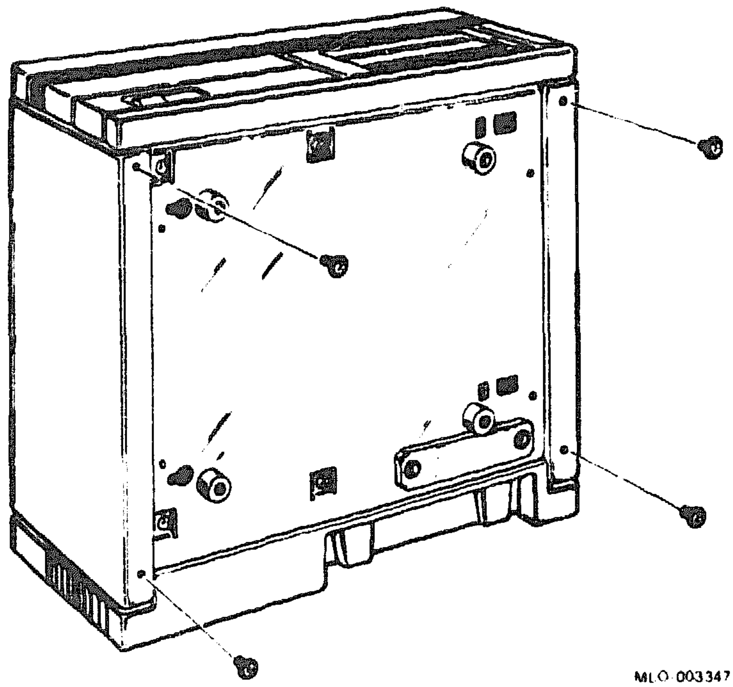
FRU	Section
TZK50 controller board	6.3.3.1
TK50 tape drive	6.3.3.2
Power supply	6.3.3.3
SCSI ID switchboard	6.3.3.4
Resistor load board	6.3.3.5

6.3.3.1 TZK50 Controller Board Removal

Remove the TK50 tape drive as follows:

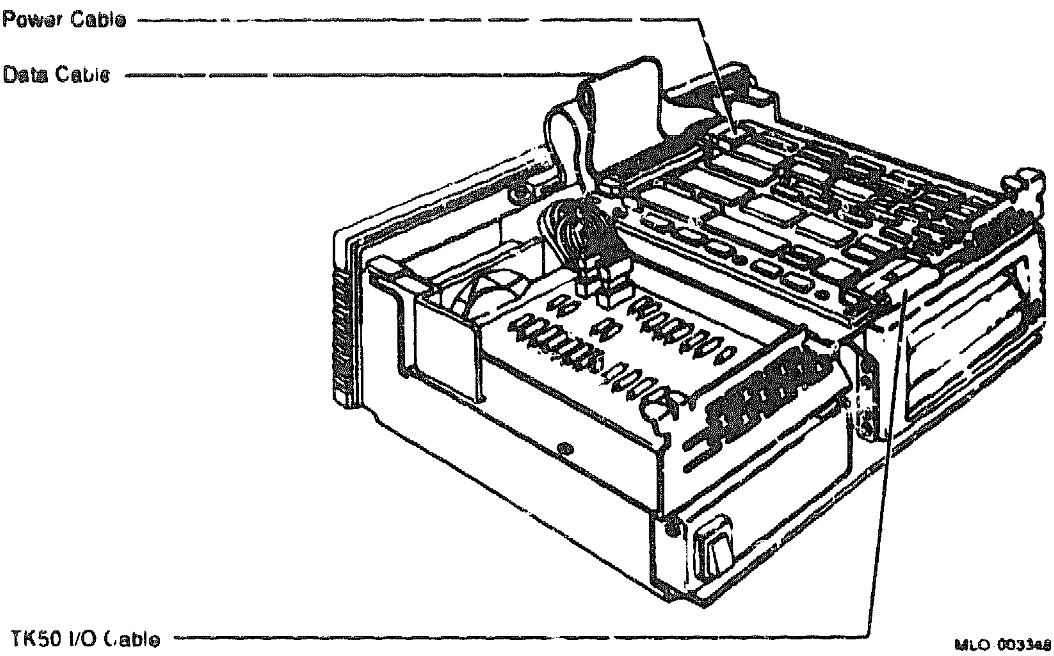
1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–22.
3. Disconnect the data cable (J3), the TK50 tape drive I/O cable (J1) and the power cable (P1) from the TZK50 controller board. See Figure 6–23.

Figure 6–22 TK50Z Expansion Box Cover Screws



4. If the TK50Z expansion box contains the SCSI ID switchboard, disconnect the switchboard cable from the jumper pins on the TZK50 controller board.
5. Remove the TZK50 controller board from the shield.
6. If you are removing the tape drive or the power supply, return to that procedure now. Otherwise, proceed to the next step.
7. Replace the TZK50 controller board by reversing the previous procedure.

Figure 6–23 TZK50 Controller Board Cables

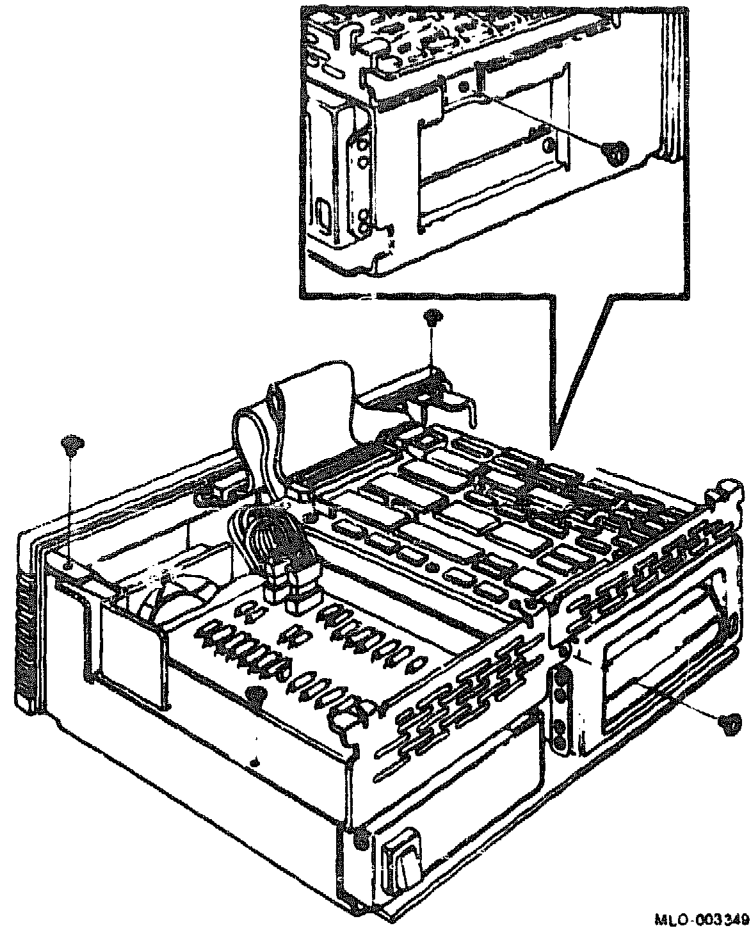


6.3.3.2 TK50 Tape Drive Removal

The following procedure describes how to remove the TK50 tape drive:

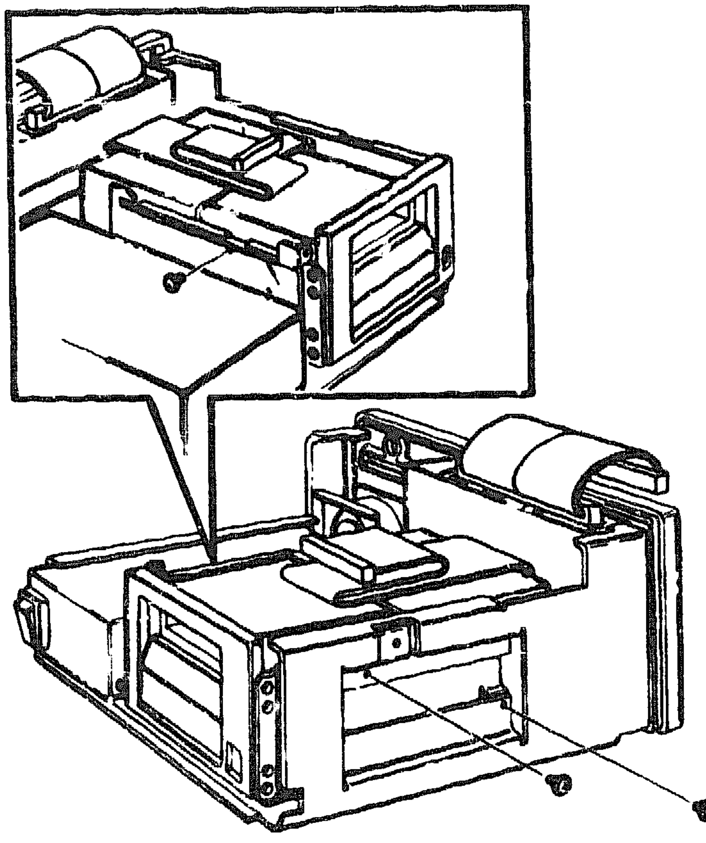
1. Remove the TZK50 controller board. See Section 6.3.3.1.
2. Disconnect the power cable on the resistor load board that comes from the power supply.
3. Remove the five shield screws. See Figure 6–24.
4. Disconnect the SCSI cable and the terminator, or both of the SCSI cables from the rear of the TK50Z expansion box.
5. Lift the shield up and off the chassis.

Figure 6–24 TK50Z Expansion Box Shield Screws



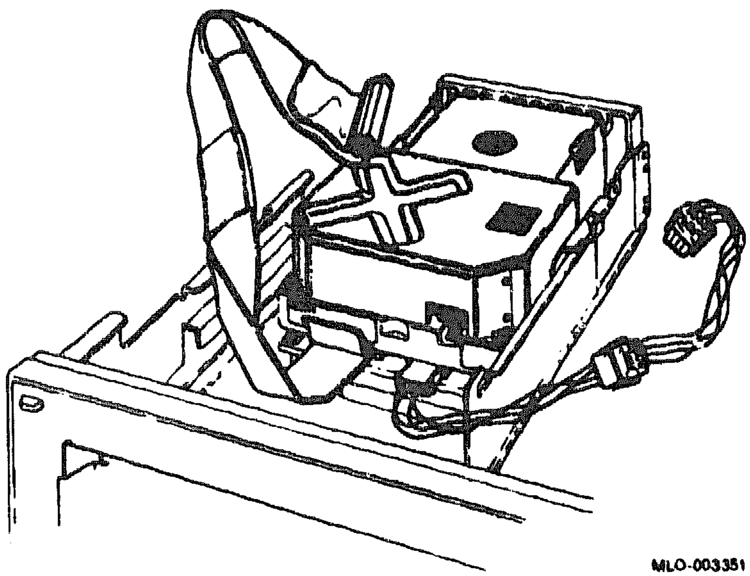
6. Remove the three drive mounting screws. See Figure 6–25.

Figure 6–25 TK50Z Expansion Box Drive Mounting Screws



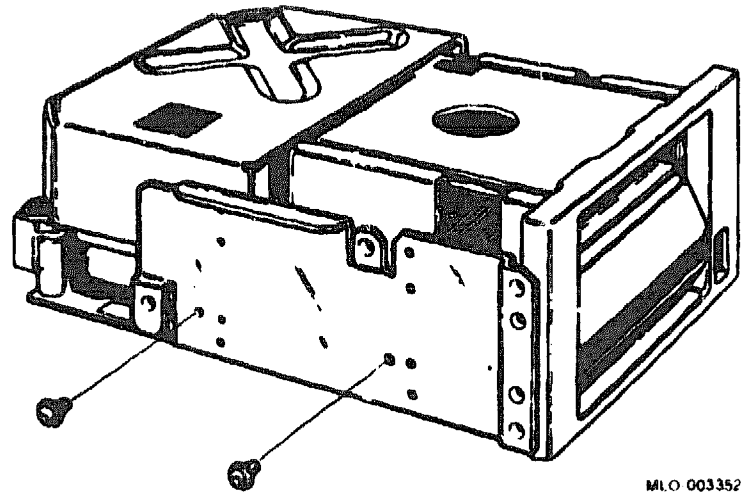
7. Slide the tape drive out halfway and disconnect the I/O cable and the power cable from the back of the drive, then remove the drive. See Figure 6–26.

Figure 6–26 Tape Drive Cables



8. Remove the four screws and remove the mounting brackets from the drive. See Figure 6-27.

Figure 6-27 TK50 Mounting Brackets Screws



9. Replace the tape drive by reversing the previous procedure.

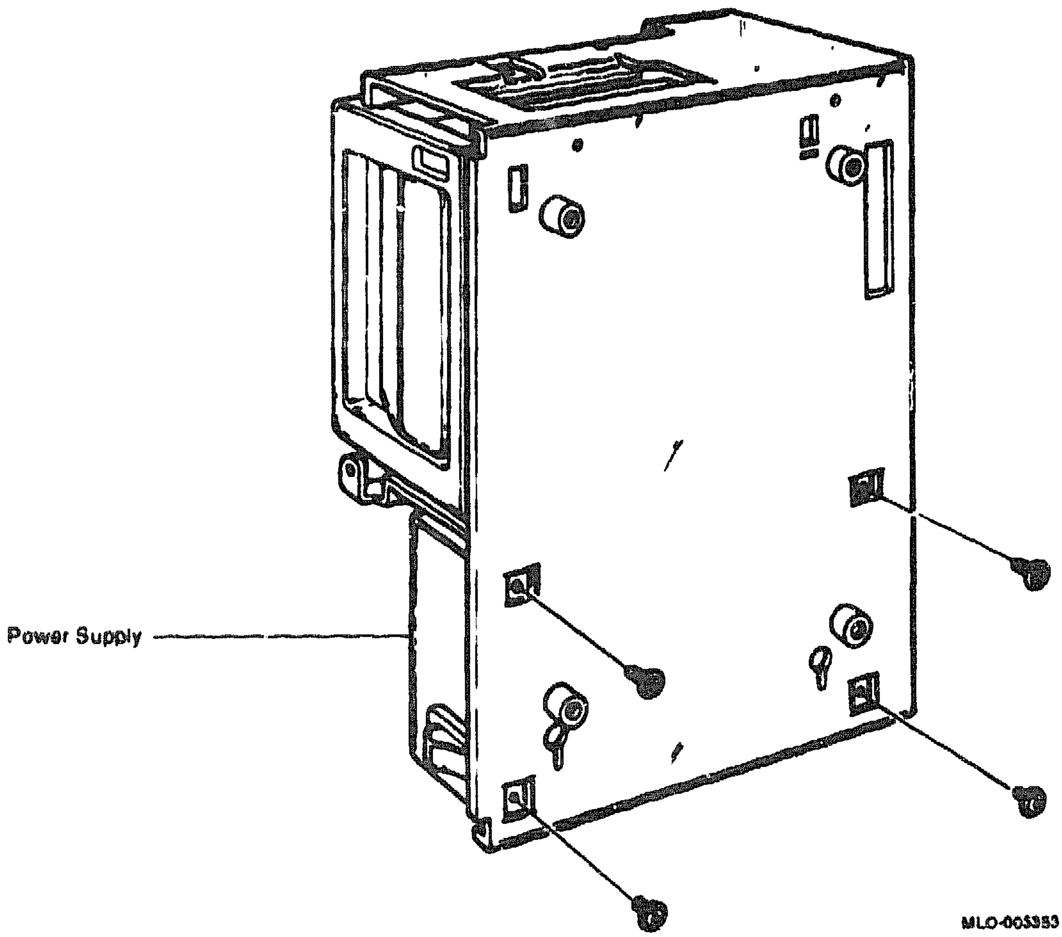
6.3.3.3 Power Supply Removal

Remove the TK50Z expansion box power supply as follows:

1. Remove the TZK50 controller board. See Section 6.3.3.1.
2. Disconnect the power cable on the resistor load board that comes from the power supply.
3. Unscrew the five shield screws. See Figure 6-24.
4. Disconnect the SCSI cable(s) from the back of the expansion box.
5. Lift the shield up and off the main chassis.
6. Remove the three drive mounting screws. See Figure 6-25.

7. Disconnect the power cable from the back of the drive.
8. Slide the drive back into the box, put the expansion box on its side, and remove the four power supply screws. See Figure 6–28.
9. Replace the power supply by reversing the previous procedure.

Figure 6–28 TK50Z Expansion Box Power Supply Screws



6.3.3.4 SCSI ID Switchboard Removal

The SCSI ID switchboard is on the inside back wall of the TK50Z-GA expansion box. It contains two switch packs. Only one is on the TK50Z-GA expansion box, and connects to the jumper connectors on the TZK50 controller board.

Remove the switchboard as follows:

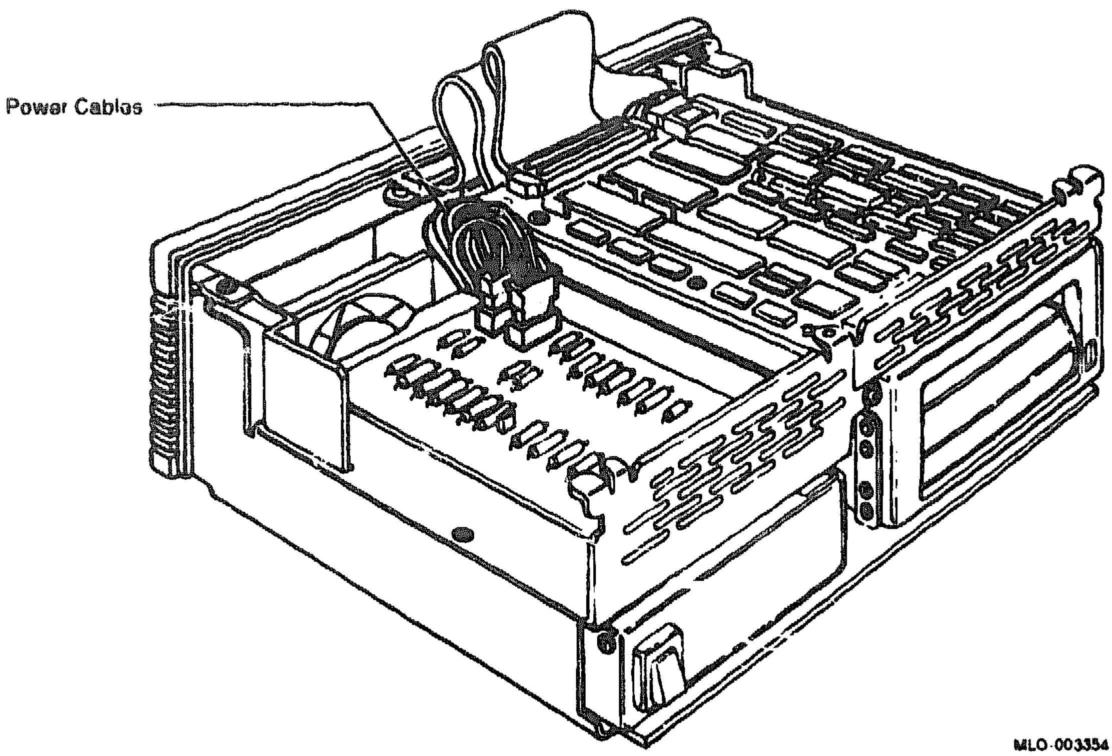
1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–22.
3. Disconnect the SCSI ID switch cable from the SCSI ID switchboard.
4. Remove the two screws from the board and remove the board from the expansion box.
5. Set the switch settings on the new SCSI ID switchboard to the same position as on the old board you just removed. Figure 6–20 shows the default SCSI ID switch settings (ID=5).
6. Install the new SCSI ID switchboard by reversing the previous procedure.

6.3.3.5 Resistor Load Board Removal

Remove the resistor load board as follows:

1. Switch off power to the expansion box.
2. Unscrew the four cover screws and remove the expansion box cover. See Figure 6–22.
3. Disconnect the two resistor load board power cables. See Figure 6–29.
4. Remove the resistor load board from the shield.
5. Replace the resistor load board by reversing the previous procedure.

Figure 6–29 TK50Z Expansion Box Resistor Load Board Power Cables



7
Operating Information

This chapter describes the booting procedures for the MicroVAX 3100, the VAXserver 3100, and the InfoServer 100 systems and the operating procedures for the TZ30 tape drive, the RRD40 compact disk drive, and the RX23 diskette drive.

7.1 Booting the MicroVAX 3100 and VAXserver 3100

The MicroVAX 3100 and VAXserver 3100 have internal flags that govern booting. When the system is shipped, these flags are set so that the system runs the power-up tests, then halts, displaying the console prompt (>>>). Use the BOOT command to boot the system from the system disk (DKA300).

If the system is not new, these flags may have been changed. Therefore, you need to determine which device you need to boot from before you can boot the operating system. Enter BOOT and the device-name if you already know which device you need to boot from, and the system boots from that device. Enter SHOW DEVICE to view all the devices if you do not know which device you need to boot from. Figure 7–1 shows an example of the SHOW DEVICE command.

Figure 7–1 Example of the SHOW DEVICE Command

```
>>> SHOW DEVICE
VMS/VMB   ULTRIX  ADDR        DEVTYP   NUMBYTES  RM/FX  WP  DEVNAM
-------   ------  ----        ------   --------  -----  --  ------
ESA0      SE0    08-00-2B-03-79-1F
DKA300    RZ3    A/3/0/00     DISK     104.6 MB  FX         RZ23
MKA500    TZ5    A/5/0/00     TAPE     ........  RM
...HostID....    A/6          INITR
DKB200    RZ10   B/2/0/00     DISK     104.6 MB  FX         RZ23
DKB300    RZ11   B/3/0/00     DISK     102.4 MB  FX         RZ23
DKB400    RZ12   B/4/0/00     RODISK   205   MB  RM     WP  RRD40
...HostID....    B/6          INITR

>>>
```

ESA0 — the Ethernet device and the Ethernet address of the system.

...HostID... — the SCSI bus controller.

Device numbers for VAX/VMS operating systems.

Device numbers for ULTRIX operating systems.

Address.

Device type.

Number of megabytes.

Removable or fixed disk.

Write protected.

Device name.

The system can include the following devices:

- DKAx00[1] — RZ23 or RZ55 on SCSI-A bus
- DKBx00[1] — RZ23 or RZ55 on SCSI-B bus
- DUAx00[1] — RX23 on SCSI-A bus
- DUBx00[1] — RX23 on SCSI-B bus

[1] The x indicates the SCSI address ID of the drive (0 to 7)

- ESA0 — Ethernet booting device.
- MKAx00[1] — Tape drive on SCSI-A bus
- MKBx00[1] — Tape drive on SCSI-B bus

If no device name is specified when entering the BOOT command, the system checks NVR for a default device and boots off that device. If no device is stored in NVR, the system automatically assigns ESA0 as the boot device and sends out a boot inquiry over the Ethernet once every 30 seconds for 5 minutes. If no host responds within the first 5 minutes, the system waits for 5 minutes. The system then starts sending a boot inquiry again every 30 seconds for 5 more minutes. This pattern is repeated until a host boots the node or until you press the halt button.

7.2 The TZ30 Tape Drive

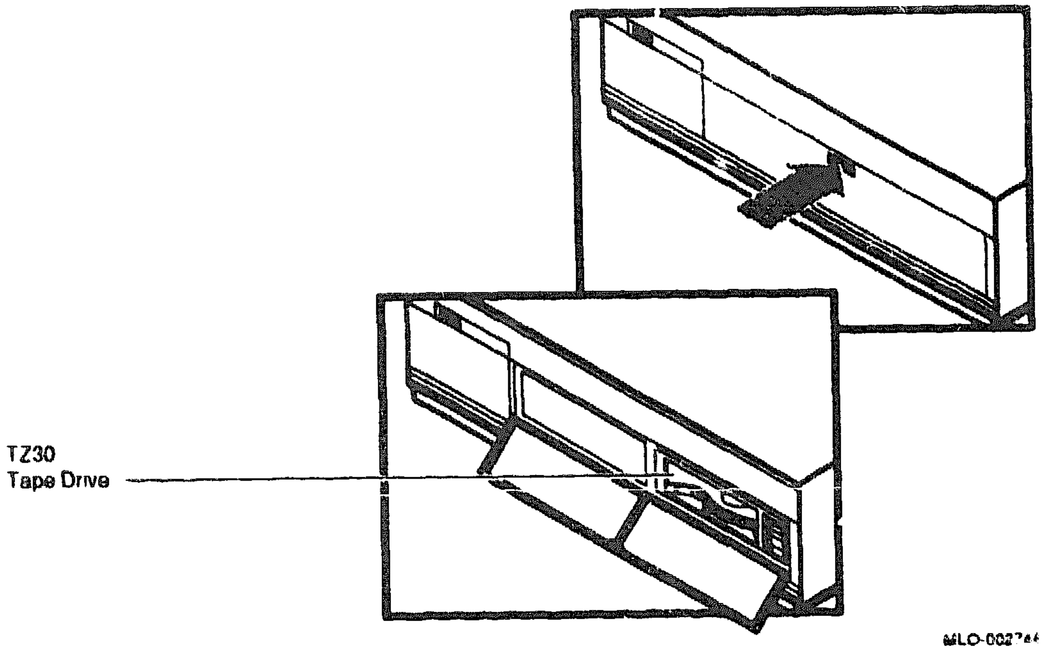
The TZ30 is a cartridge tape drive that can store up to 95Mb (or characters) per CompacTape cartridge or CompacTape II cartridge. The TZ30 has the same capabilities as larger tape drives from Digital (such as TU81) and fits into a half height slot in your system.

The TZ30 can read data from, or write data to, a tape that was written by a TK50. The TZ30, however, can not read or write data from a tape that was written by the TK70.

The TZ30 is used primarily to backup storage devices, and to load software onto your system. For example, the VMS operating system may be loaded from the TZ30. The tape-distributed version of VMS is loaded from a TK50-formatted tape.

In Model 10 systems, the TZ30 tape drive can be accessed directly. To access the TZ30 tape drive in Model 20 systems, position the system unit so that the front of it is facing you. Push and then release the cover in the direction indicated by the arrows in Figure 7-2.

Figure 7–2 Accessing the TZ30 Tape Drive



7.2.1 Tape Cartridges

The TZ30 uses a tape cartridge (labeled CompacTape or CompacTape II) that contains the magnetic tape on a single reel. This single reel is an important feature to understand, because it affects the use of the TZ30.

When you insert the tape cartridge into the drive and load it, the tape is automatically threaded onto a take-up reel inside the drive. When the tape has been fully wound onto the take-up reel, it can take up to 100 seconds to rewind completely.

NOTE

The tape must be fully rewound before you can remove the cartridge from the tape drive.

7.2.2 TZ30 Controls and Indicators

The TZ30 tape drive has two controls, an unload button and a cartridge lever, and four indicators, three LEDs and a beeper. Figure 7–3 shows the location of the controls and indicators on the TZ30 tape drive. Table 7–1 provides the functions of the controls and Table 7–2 gives the status information provided by the indicators.

Figure 7–3 TZ30 Tape Drive (Front View)

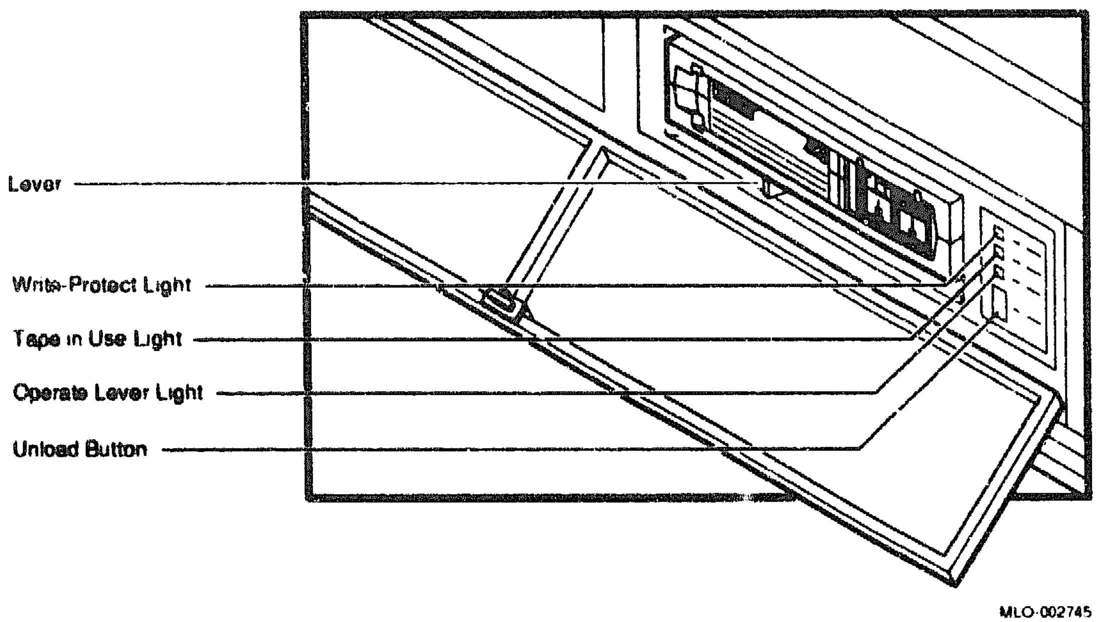


Table 7–1 TZ30 Controls

Control	Function
Unload Button	The unload button rewinds and disengages the tape from the take-up reel inside the TZ30. The tape must be completely rewound and unloaded back into the cartridge before the cartridge can be removed from the drive.

Table 7-1 (Cont.) TZ30 Controls

Control	Function
Cartridge Lever[1]	The cartridge lever is used to lock or unlock a tape cartridge. To insert a tape cartridge, the cartridge lever must be in the unlock position. Once a cartridge is inserted and the green LED lights, move the cartridge lever to the lock position. To eject the cartridge from the drive, (only when the green LED is on or blinking, and after the momentary beeper sounds), move the cartridge lever to the unlock position.

[1]When using the cartridge lever, be sure it is completely positioned in the lock or unlock position before beginning the next operation.

Table 7-2 TZ30 Indicators

Indicator	State	Condition
Green LED - Lever	On	OK to operate the cartridge lever.
	Off	Don't operate the cartridge lever.
	Blinking	The drive has detected a cartridge or calibration error.
Yellow LED - Tape in Use	Blinking[1]	Tape in use[2].
	On	Tape loaded and ready for use.
Orange LED - Write Protected	On	Tape is write protected.
	Off	Tape is write enabled.
All three LEDs	On	The power-up diagnostic is in progress[3].
All three LEDs	Blinking	Drive fault.

[1]Intermittent fast blinking indicates that a write is in progress. Continuous fast blinking indicates that a read is in progress. Medium blinking indicates calibration. Slow blinking indicates that the tape is initializing, loading, unloading or rewinding.

[2]LED blinks slowly for 10 seconds indicating drive initialization. This occurs only on power-up after the power-up diagnostic has run.

[3]All three LEDs light for a few seconds as the power-up diagnostic is running. If all three LEDs stay on, the power-up diagnostic has failed.

Table 7-2 (Cont.) TZ30 Indicators

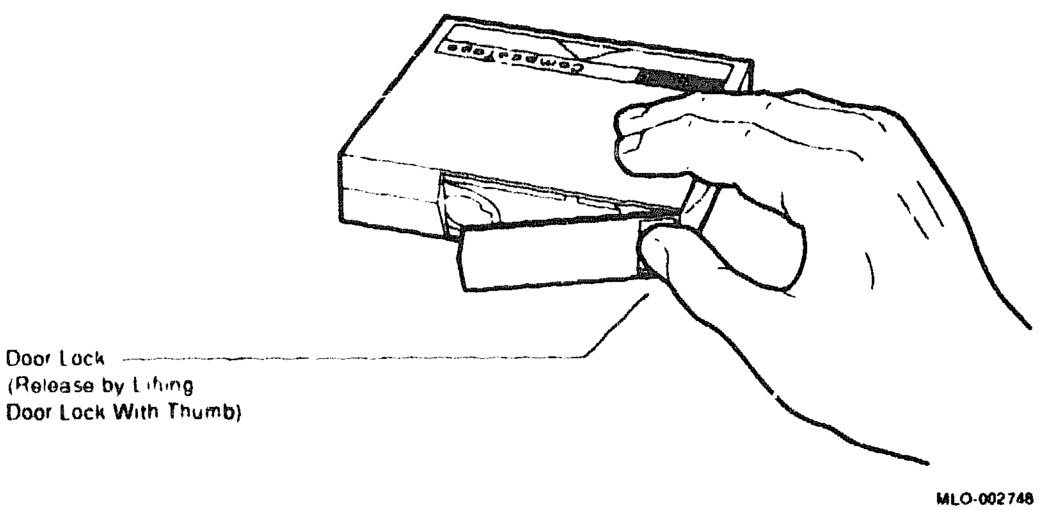
Indicator	State	Condition
Beeper[4]	Two beeps	Indicates that the tape is unloaded and can be removed from the drive.

[4]The drive beeps once when it is powered-up. If a tape cartridge is not locked in the drive, it will beep twice after self-test diagnostics and drive initialization are completed. If a tape cartridge is locked into the drive before power-down, then upon power-up the drive will beep once and attempt to load the tape cartridge.

7.2.3 TZ30 Operation

Before inserting a new cartridge in the tape drive, open the cartridge door and inspect the position of the leader. See Figure 7-4.

Figure 7-4 TK50 Tape Cartridge Door



Before using the TZ30 for the first time, check the position of the take-up leader in the TZ30. Figure 7-5 shows some potential misalignments and how to fix them. Use a small nonmetallic instrument to realign the take-up leader if necessary.

7.2.3.1 Inserting and Using the Tape Cartridge

To insert a tape cartridge, perform the following steps:

1. Be sure that the cartridge lever is in the unlock position.
2. Insert the tape cartridge.

   Once most of the cartridge is inserted into the drive, you must complete this procedure. If you wish to use another cartridge, complete this procedure and perform the unload procedure to remove the tape cartridge.

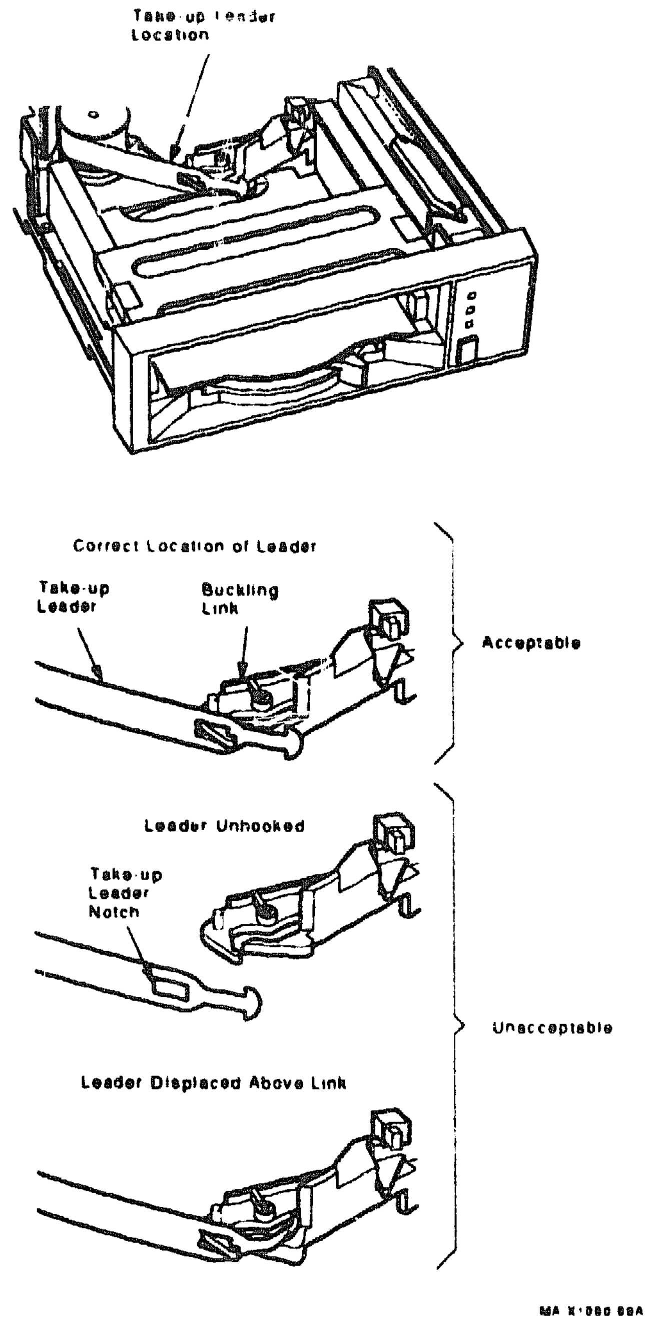
   If the tape cartridge cannot be inserted into the TZ30, move the cartridge lever to the lock position. Now move the cartridge lever back to the unlock position and reinsert the cartridge. Do not push the tape cartridge into the TZ30 while moving the cartridge lever between the lock and unlock positions. Otherwise the TZ30 interprets this as an insertion of the tape cartridge.
3. The green LED will light.
4. Move the cartridge lever to the lock position to lock the tape cartridge in the drive. The green LED turns off and the yellow LED begins to blink, indicating that the tape is loading. When the tape is loaded (ready for use), the yellow LED stays on steadily. Whenever the yellow LED is on steadily and the green LED remains off, the tape is ready to use.

If the write protect switch on the cartridge is in the protected position, the orange write protect LED is on and you will be unable to write data to the tape. If you move the write protect switch to the write enable position during operation, the system software does not recognize the fact that the tape is no longer write protected. You must reload the tape cartridge again before the system software recognizes the cartridge as write enabled.

Similarly, if you move the write protect switch from the write enabled position to the write protected position during operation, the tape is not actually write protected until the operating system dismounts and remounts the tape.

When the yellow LED is on steadily, you can proceed with your operation. For example, you may boot your operating system, or possibly, back up files onto the TZ30. Refer to your system documentation for instructions for these and other operations.

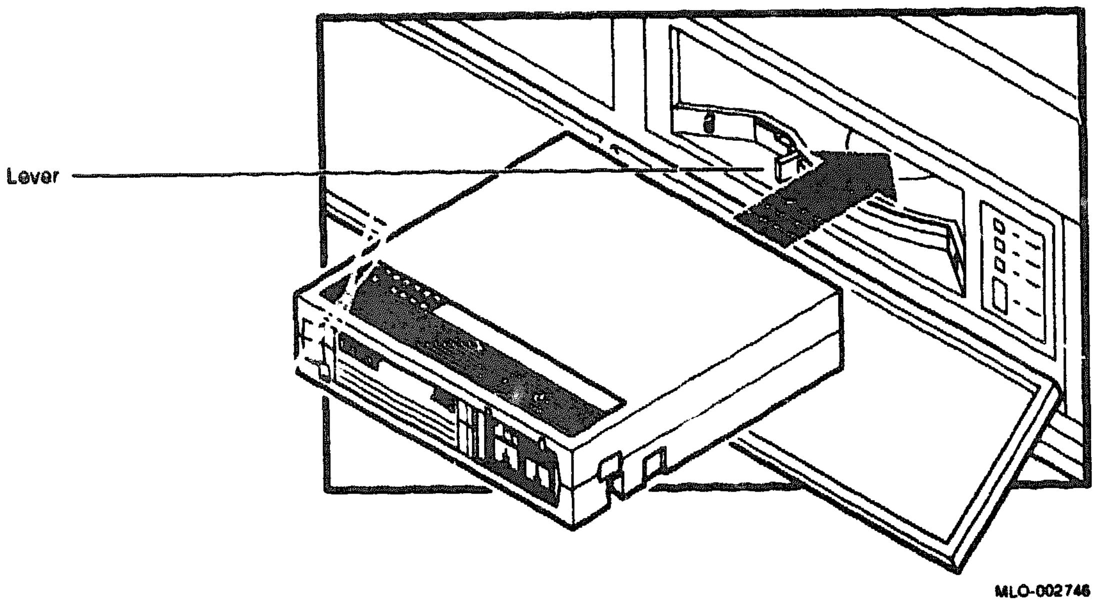
Figure 7–5 TZ30 Take-Up Leader Adjustment



When the tape drive is reading, writing, or rewinding a tape cartridge, the yellow LED blinks *rapidly*.

If errors occur during an operation, all three LEDs blink. The green LED will blink if a faulty tape cartridge is inserted.

Figure 7–6 Inserting a Tape Cartridge



7.2.3.2 Removing a Tape Cartridge from the Drive

The following procedure describes how to remove a tape cartridge:

1. Press the unload button (Figure 7–7) or issue the appropriate system software command. The yellow LED will flash as the tape rewinds. Once the tape has rewound completely, the beeper sounds twice and the green LED will light.

   NOTE

   If you use the DISMOUNT command from the console, you do not need to press the unload button. If you use the /NOUNLOAD qualifier with the DISMOUNT command, you must press the unload button. If you do not use the /NOUNLOAD qualifier with the DISMOUNT command, you will receive a "device not software enabled" message from the operating system since the tape will unload. If this occurs, you will have to physically remove the cartridge and reload the tape drive to recover.

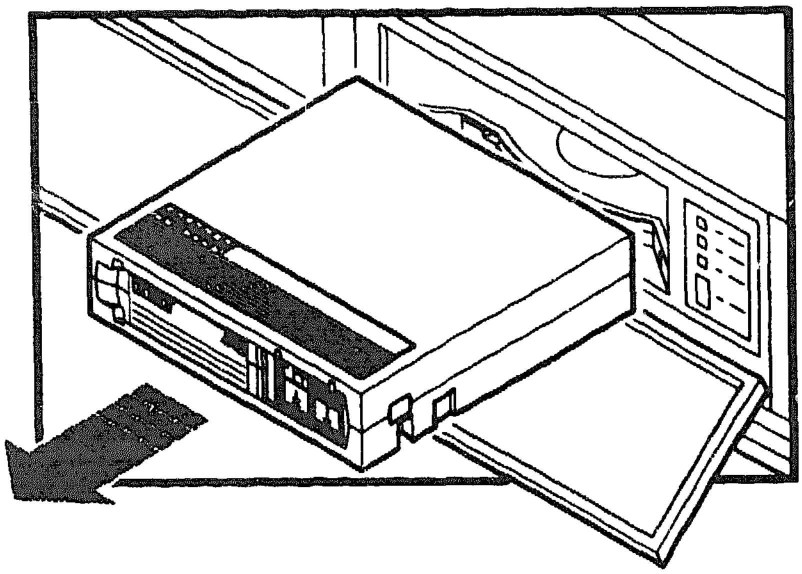
2. Move the cartridge lever to the unlock position.

3. The cartridge ejects and can be removed from the tape drive.

CAUTION

Remove the tape cartridges from the drive before turning off the drive's power. Failure to do this can result in damage to the cartridge and tape drive.

Figure 7–7 Removing a Tape Cartridge

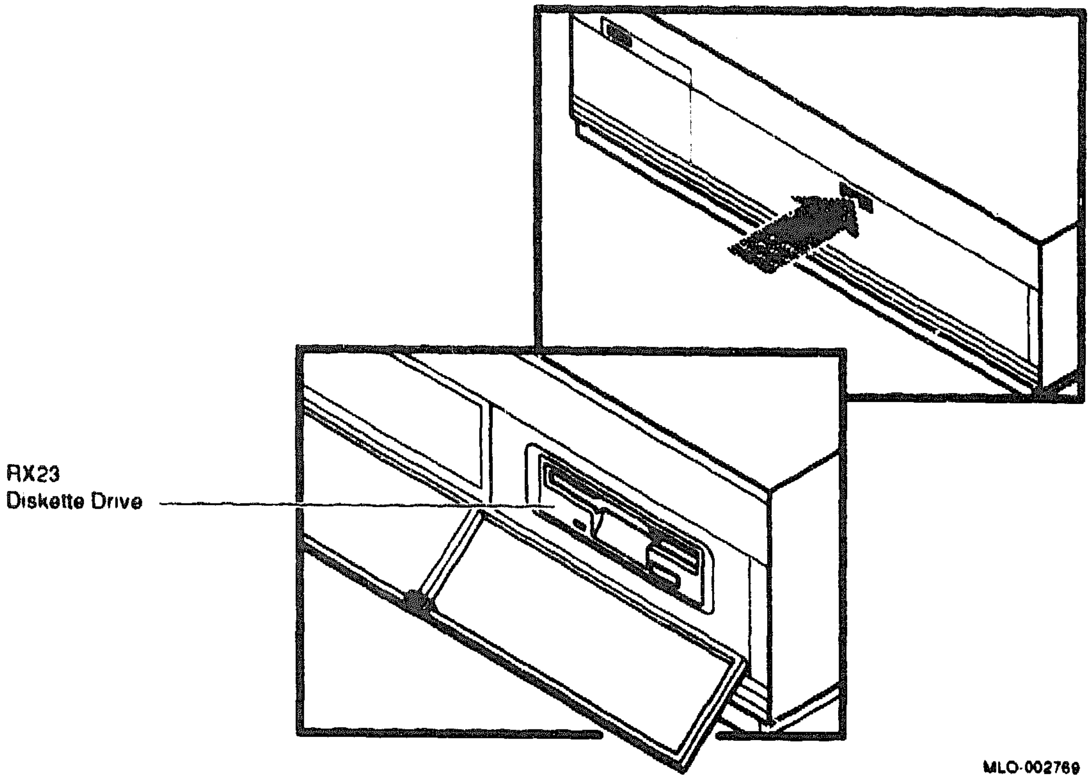


7.2.4 RX23 Diskette Drive

Depending on the configuration, your system may include one or two RX23 diskette drives. These devices enable you to read information from and write information to 3.5 inch removable diskettes.

In Model 10 systems, the RX23 diskette drive can be accessed directly. To access the RX23 diskette drive in Model 20 systems, position the system unit so that the front of it is facing you. Open the cover by pushing it in the direction indicated by the arrow in Figure 7–8 and then releasing it. Use the same procedure to close the cover when you have finished using the RX23.

Figure 7–8 Accessing the RX23 Diskette Drive



NOTE

The RX23 diskette drive is shown in the right compartment. It may also be installed in the left compartment.

7.2.4.1 Diskettes

The RX23 diskette drive uses RX23K diskettes which have a capacity of 1.4Mb.

7.2.4.2 Inserting a Diskette

The drive can hold one diskette.

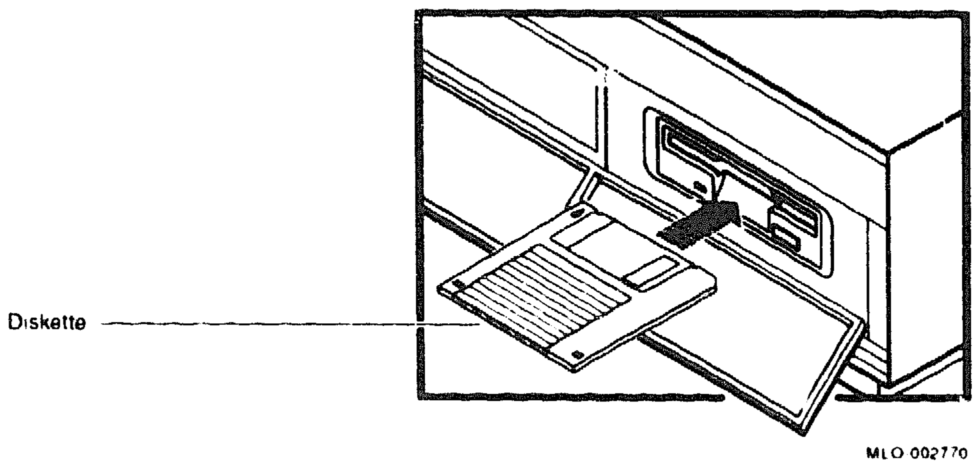
CAUTION

Never remove or insert a diskette while the diskette drive is performing a function. Inserting or removing a diskette while your system is using the diskette can cause incorrect data to be written to the diskette, and can cause damage to the diskette itself. Wait until the diskette drive finishes doing whatever you requested it to do. When the diskette drive is in use, the green light on the front of the diskette drive is on.

To insert a diskette into the diskette drive slot, slide the diskette into the drive, as shown in Figure 7–9.

The diskette slides straight in and drops down to its load position.

Figure 7–9 Inserting a Diskette

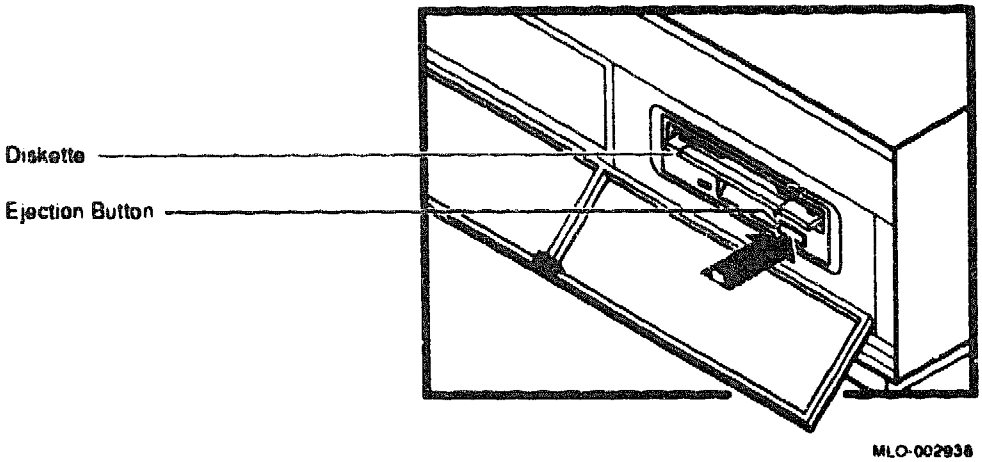


7.2.4.3 Removing a Diskette

You must dismount the diskette drive before removing a diskette. For information on dismounting, see your software documentation.

To remove a diskette from the diskette slot, push the eject button in the lower right side of the diskette drive, as shown in Figure 7–10.

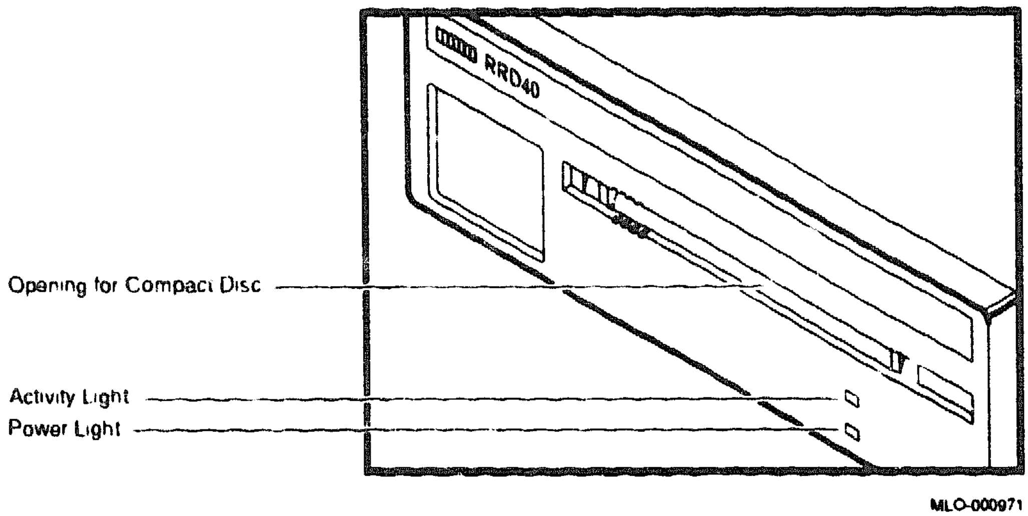
Figure 7–10 Removing a Diskette



7.3 The RRD40 Compact Disc Drive

The RRD40 is available in the InfoServer 100 system and as a desktop expansion box. Figure 7–11 shows the RRD40 expansion box.

Figure 7–11 RRD40 Compact Disc Expansion Box



7.3.1 Front Panel of the RRD40 Expansion box

The front panel consists of a disc access door, an activity indicator, and a power indicator. See Figure 7–11. The activity indicator lights when a disc is correctly loaded into the RRD40 drive. The indicator flashes when the disc is transferring data. The power indicator lights when power is on.

7.3.2 Loading a Disc

When loading a disc, the entire disc caddy is inserted into the disc access door on the drive.

CAUTION

Do not remove the disc from the caddy.

The following procedure describes how to load a disc:

1. Make sure the power is on.

2. Examine the disc caddy. Make sure that it is not cracked or damaged in any way. Never load a damaged caddy into an RRD40 drive.
3. Examine the disc inside the caddy. Note that one side is labeled. The label should always be facing up as you insert the disc into the drive. When the label is facing up, the four notches on the disc housing are on the left. See Figure 7–12. These notches line up with the four similar notches on the front of the RRD40 drive.

NOTE

If you have the disc positioned label side up and the notches are on the right, then the disc is oriented incorrectly in the caddy. Proceed no further with the disc loading. See Section 7.3.4 and repair the disc and the caddy.

4. Insert the disc caddy. See Figure 7–12. Line up the notches on the caddy with the notches on the disc access door. Slide the caddy in as far as it will go and then remove it. When removed, notice that the disc and its housing remain in the drive. Only the transparent sleeve comes out.
5. Check that the front panel activity indicator lights within 5 seconds. If the drive accepted the disc and the activity indicator does not light, then the disc may have been orientated in the caddy incorrectly. Unload the disc using the instructions in the following section. Refer back to step 3 and examine the disc orientation in the caddy. If the disc is orientated correctly, the RRD40 drive may be faulty.

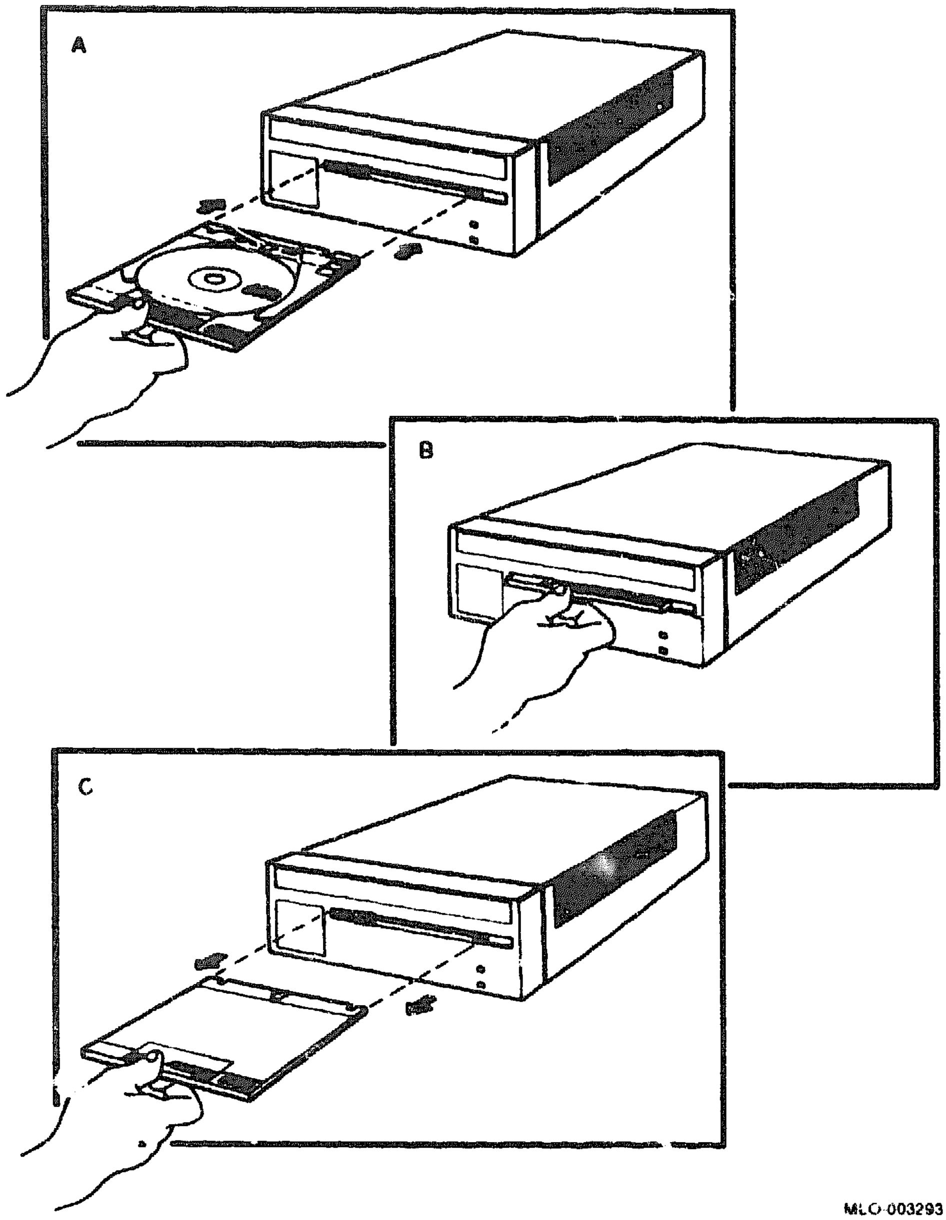
7.3.3 Unloading a Disc

Before unloading a disc, make sure that the activity indicator is not flashing. If it is flashing, then the RRD40 is transferring data. Wait until the indicator stops flashing.

The following procedure describes how to unload a disc:

1. Orient the transparent sleeve for loading. Make sure the arrow is going into the drive first. See Figure 7–12 for guidelines (the unloading procedure is the same as the loading procedure).
2. Insert the sleeve into the access door as far as it will go.
3. Remove the caddy. The disc and housing will be back in the sleeve. The activity indicator will go out.

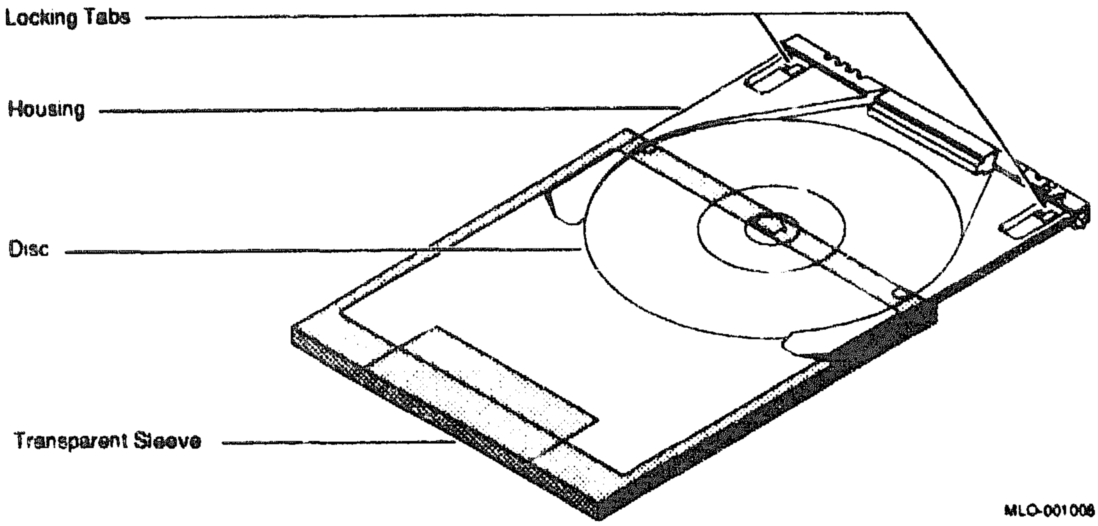
Figure 7–12 RRD40 Compact Disc Loading



7.3.4 Disc and Caddy Repair

The RRD40 media is contained inside a protective caddy. The caddy consists of three parts: the disc, the disc housing, and the transparent sleeve. See Figure 7–13.

Figure 7–13 Disc Parts



If the transparent sleeve is damaged or cracked or if the disc needs cleaning, the caddy can be taken apart.

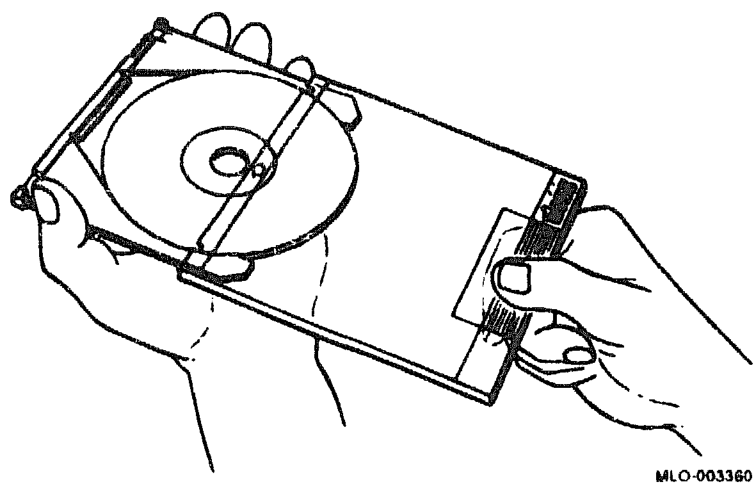
It is very important that the disc is mounted in the caddy correctly. Failure to mount the disc correctly makes the disc inaccessible to the SCSI bus controller.

7.3.5 Removing the Disc from the Caddy

To remove the disc from the caddy for cleaning or caddy repair, proceed as follows:

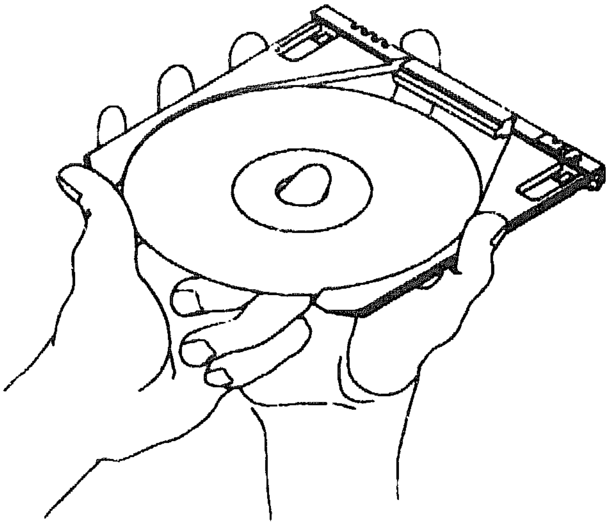
1. Hold the caddy so that it is facing label side down. Locate the locking tabs on either side of the disc housing. See Figure 7-13.
2. For each locking tab, press down on the tab while slightly separating the housing from the sleeve. Use your fingernail or a sharp, pointed instrument.
3. When both tabs have been disengaged, pull the disc housing out to about the midpoint of the disc. See Figure 7-14.

Figure 7-14 Sep :rating the Disc from the Caddy



4. Hold the disc housing on each side. See Figure 7-14. Exert inward pressure on the housing so the disc does not fall out. Remove the sleeve from the housing. Place the sleeve aside.
5. Grasp the disc with your free hand. See Figure 7-15. Position your thumb on the outer edge of the disc and your index finger in the center hole of the disc. Release pressure from the housing and remove the disc.

Figure 7–15 Removing the Disc



7.3.6 Cleaning a Disc

The disc can be cleaned with a dry, lint-free cloth. The disc should always be free of dust, dirt, and fingerprints. Always hold a disc by the edges. Never touch the data area of the disc.

To clean, wipe from the center of the disc to the edges. Use small circular strokes.

CAUTION
Do not use a continuous circular stroke around the disc.

7.3.7 Replacing the Disc in the Caddy

Assembling the caddy is essentially the reverse of the removal procedures. Make sure that your hands are positioned as shown in the illustrations. It is very important that the disc is replaced correctly.

The following procedure describes how to replace a disc in a caddy:

1. Position the housing and disc. See Figure 7–15. Always work with the disc so the label is facing down.
2. Insert the disc into the housing. The inside of the housing is grooved to accept the disc. Exert inward pressure to hold the disc in the housing.

3. Slide the housing into the transparent sleeve all the way until it clicks into place.
4. Turn the assembly over so that the label on the disc is facing up. Make sure that the notches on the housing are on the left. If the notches are not on the left when the disc is label side up, then the disc is mounted incorrectly inside the caddy. Remove the disc from the caddy and reorientate the disc.

7.4 TK50Z Tape Expansion Box

The drive unit (TK50) is located behind a protective door; it holds one removable TK50-K or TK52-K magnetic tape cartridge. Use the tape cartridge to load software, data files, or to make copies (or backups) of your files.

The TK50Z tape drive has two primary controls: the cartridge release handle and the load/unload button. The cartridge release handle allows cartridges to be inserted, locked into position, and removed. The load /unload button controls winding and rewinding of the tape. The in (on) position of the load/unload button is for loading tape cartridges. The out (off) position is for unloading tape cartridges.

7.4.1 Inserting a Tape Cartridge

Make sure the load/unload button is in the out (unload) position.

The red load/unload button comes on for approximately 4 seconds during the tape drive automatic power-up test.

The red light goes off and the green light comes on, indicating that it is safe to move the cartridge release handle.

If a cartridge is new, the tape drive performs a calibration sequence that takes approximately 40 seconds. The green light flashes rapidly and irregularly during calibration.

CAUTION

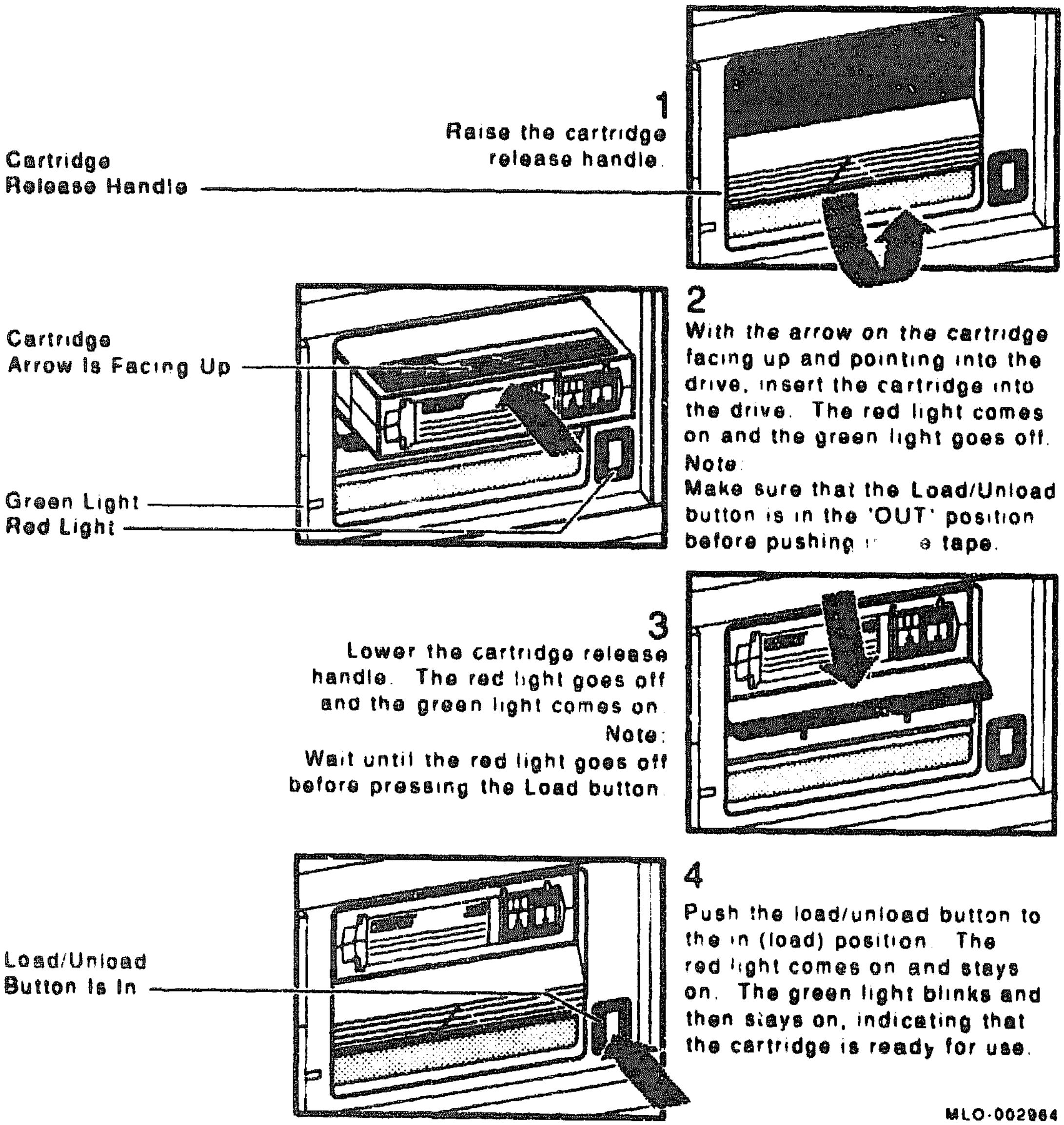
Do not move the cartridge release handle unless the red light is off and the green light is on.

Do not move the cartridge release handle while either light is flashing.

If the red light flashes rapidly at any time, press the load/unload button four times. If the problem persists, do not attempt to use the tape drive and do not remove the cartridge.

Figure 7–16 shows you how to insert and load a tape cartridge.

Figure 7–16 Inserting and Loading a Tape in the TK50Z Expansion Box



7.4.2 Summary of TK50Z Controls and Indicator Lights

Table 7–3 summarizes the function of the TK50Z controls.

Table 7–3 Function of TK50Z Physical Controls

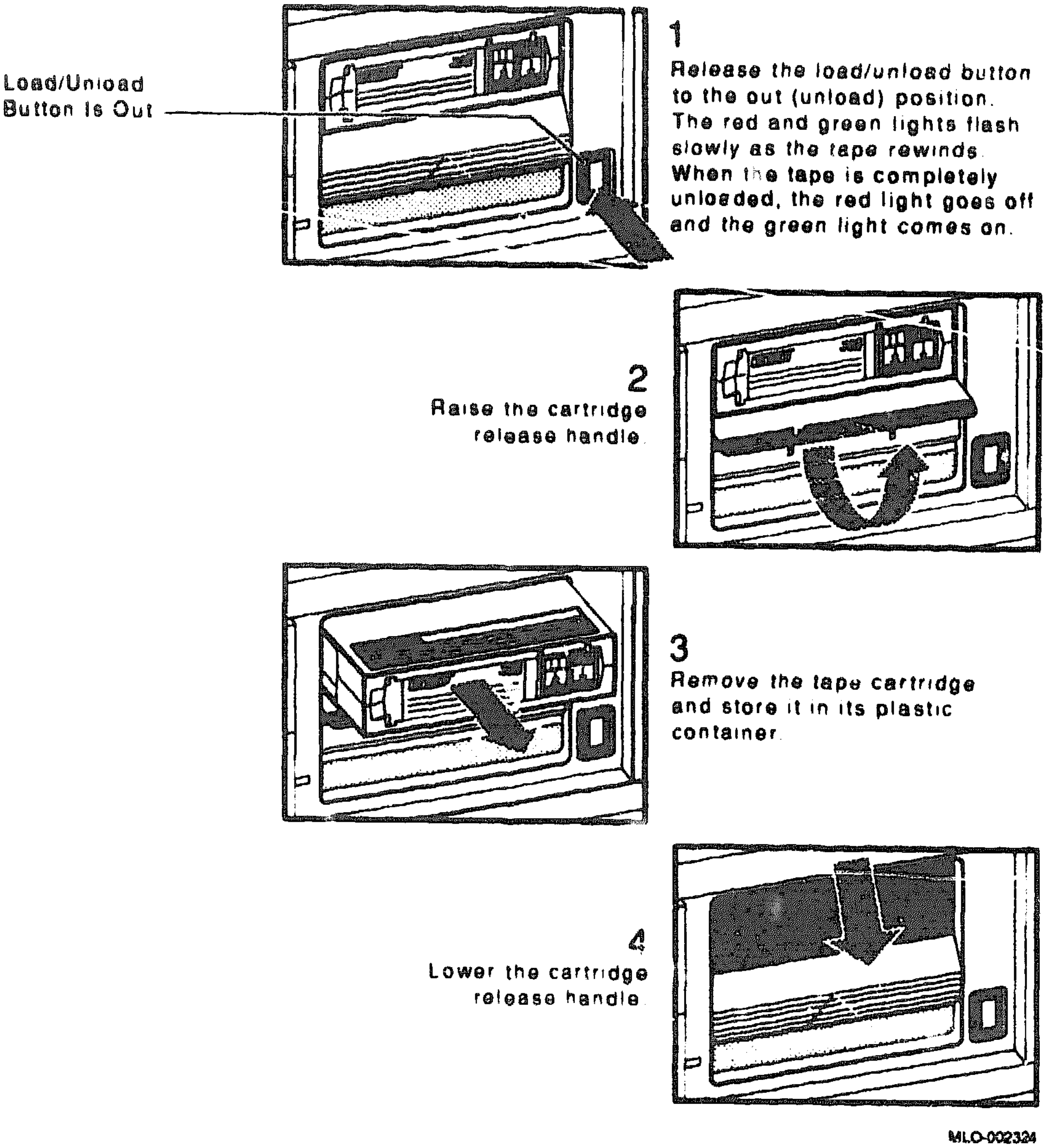
Control	Position	Function
Load/unload button	In	Loads the tape (10 to 15 seconds).
	Out	Rewinds and unloads the tape.
Cartridge release handle	Up	Allows you insert a tape or remove a tape after rewind and unload operations are completed.
	Down	Locks tape in operating position.

Table 7–4 summarizes the function of the TK50Z indicator lights.

Table 7–4 Function of TK50Z Indicator Lights

Green light	Red light	Function
Off	Off	No power to the tape drive.
On	Off	Safe to move cartridge release handle. Power is present.
Off	On	Do not move the cartridge release handle. One of the following conditions is in effect: power-up test is occurring; cartridge is inserted but handle is still up; tape is loading or unloading; tape is stopped.
On	On	Tape loaded successfully.
Flashing	On	Tape is in motion (except rewind). Read/write commands are being processed. Irregular fast flashing of green light means tape calibration is occurring (first use of tape).
Flashing slowly	Flashing slowly	Tape is rewinding.
Off	Flashing rapidly	Tape or drive fault exists.

Figure 7–17 Unloading and Removing the TK50 Tape



7.4.3 Removing a Tape Cartridge

Tape cartridges must be unloaded (rewound) before being removed from the drive. Rewinding a tape can be done under software control. Refer to your software documentation for information. Figure 7–17 shows how to remove a tape cartridge.

8
InfoServer 100

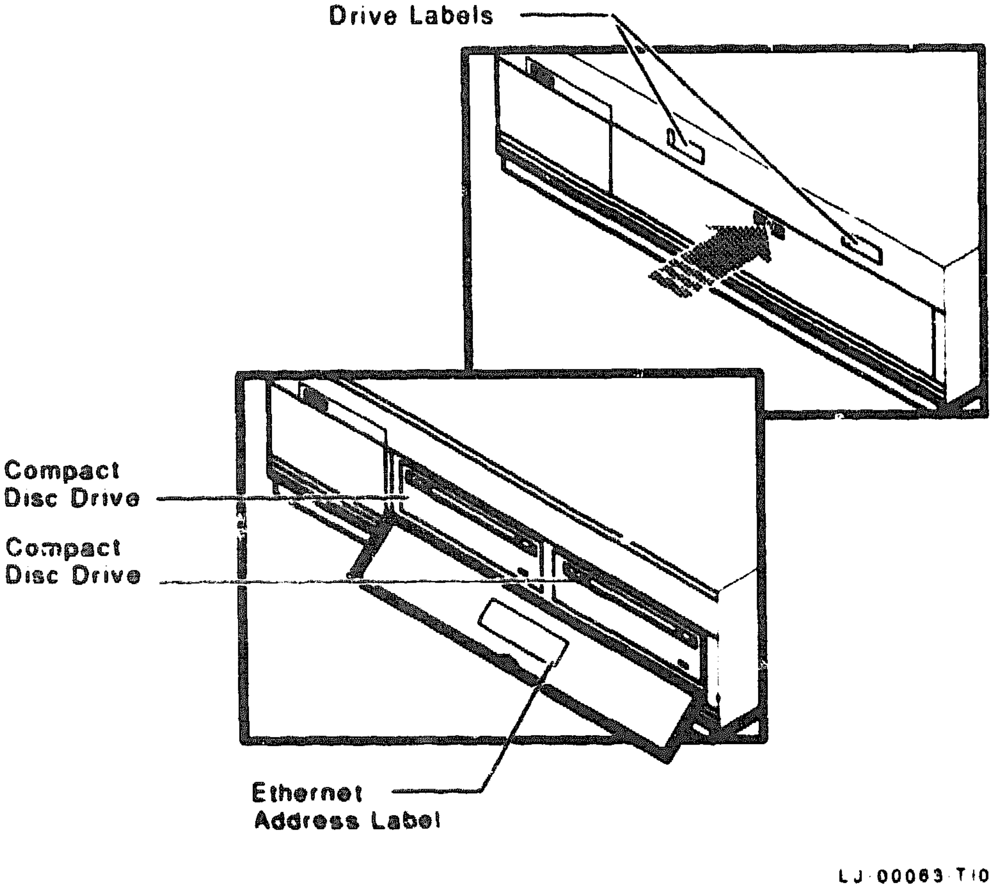
8.1 Enclosure Description

The InfoServer 100 system box is a 13.3 cm (5 ¼ in) high box, the same as used on the MicroVAX 3100 Model 20 or the VAXserver 3100 Model 20, described in Chapter 5. The InfoServer 100 system has one or two RRD40 or RRD42 compact disk drives behind the front panel of the system unit (Figure 8–1).

The InfoServer 100 contains the following FRUs:

- KA41-CA CVAX system module
- H7822 or H7083 power supply
- Either A or B below:
    A. 1 or 2 RRD40 compact disk drives, plus 1 or 2 controller modules
    B. 1 or 2 RRD42 compact disk drives, with integral controller.
- RZ23E 104-Mbyte or RZ23L 121-Mbyte hard disk drive
- Battery pack

Figure 8–1 InfoServer 100 Front Panel



As with the MicroVAX 3100 and the VAXserver 3100, one can connect additional mass storage devices to the InfoServer 100, such as:

- RZ55, RZ56 hard disk drive expansion box
- RRD40, RRD42 compact disk expansion box

Refer to Appendix H for a complete list of FRUs for the system box and for the expansion boxes.

The InfoServer 100 has various models, listed in Table 8–1. The newer models have integral CD controllers and therefore, do not require the extensive cabling required of the older models. To identify the number of components inside the box, refer to the model number on the back of the system box. (Also refer to the *MicroVAX 3100/VAXserver 3100/InfoServer 100 Systems Illustrated Parts Breakdown*, EK-A0372-IP revision 003 or higher.)

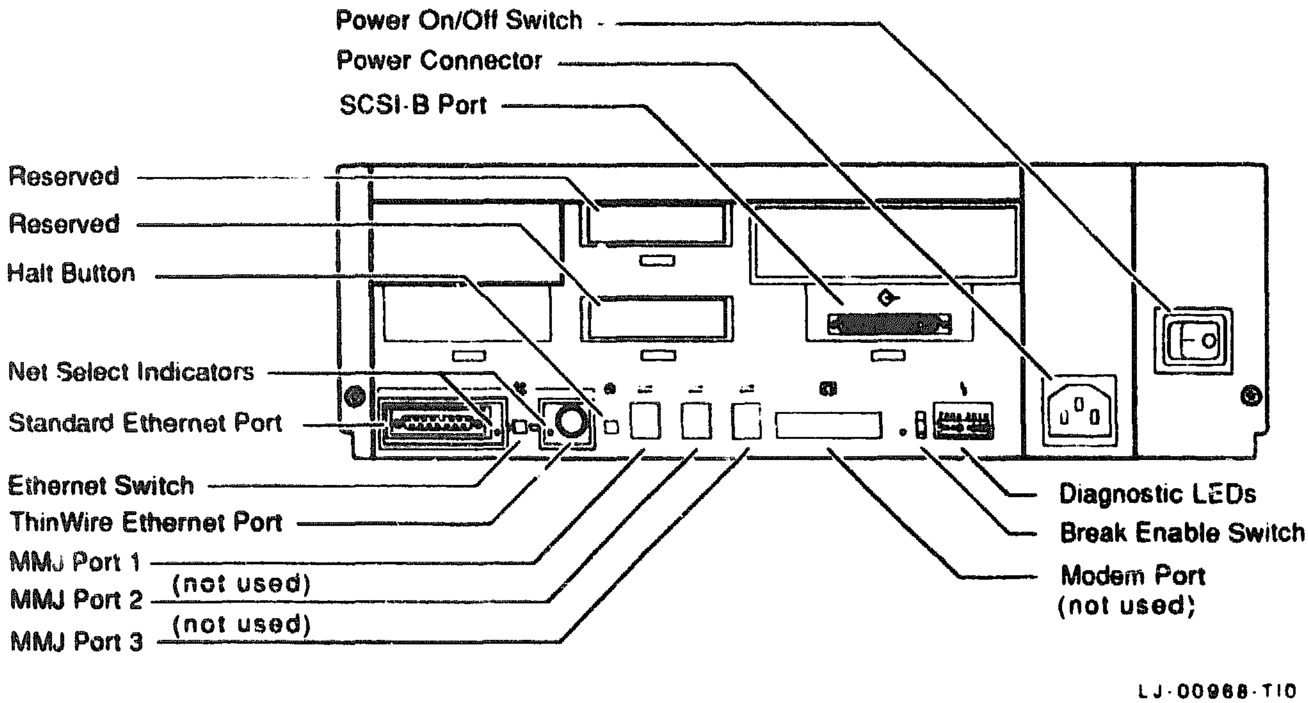
Table 8–1 InfoServer 100 Model Variations

Model	CD ROMs	Hard Disk	Power Supply	CD Cable
		Older Models		
SEABB-AX	1 RRD40-EG	RZ23L or RZ23E	H7822	50-conductor, multiconnector, flat cable, 17-02909-01-A01
SEABC-AX	2 RRD40-EG	RZ23L or RZ23E	H7822	+ Multiconnector, 50-pin, round cable, 17-02297-01
SEABB-BX	1 RRD42-GM	RZ23L	H7822	
SEABC-BX	2 RRD42-GM	RZ23L	H7822	
		Newer Models		
SEABB-CX	1 RRD42-GM	RZ23L	H7083-BA	50-conductor, multiconnector, 17-02909-01-B01 +
SEABC-CX	2 RRD42-GM	RZ23L	H7083-BA	2-connector, 50-pin, round cable, 17-03209-01

8.1.1 InfoServer 100 System Box Back Panel

Figure 8–2 shows the back panel of the InfoServer 100 system box.

Figure 8–2 InfoServer 100 Back Panel



MMJ Port 1

You can connect VTxxx terminals to the InfoServer 100 through the MMJ port 1. This port is pre-set to run at 9600 baud, so any terminal connected to this port must be set at 9600 baud.

You can use this port to connect a terminal to the server to establish a local server management system. (See the *InfoServer 100 System Operations Guide* for more information.)

Modem Port, MMJ Ports 2 & 3

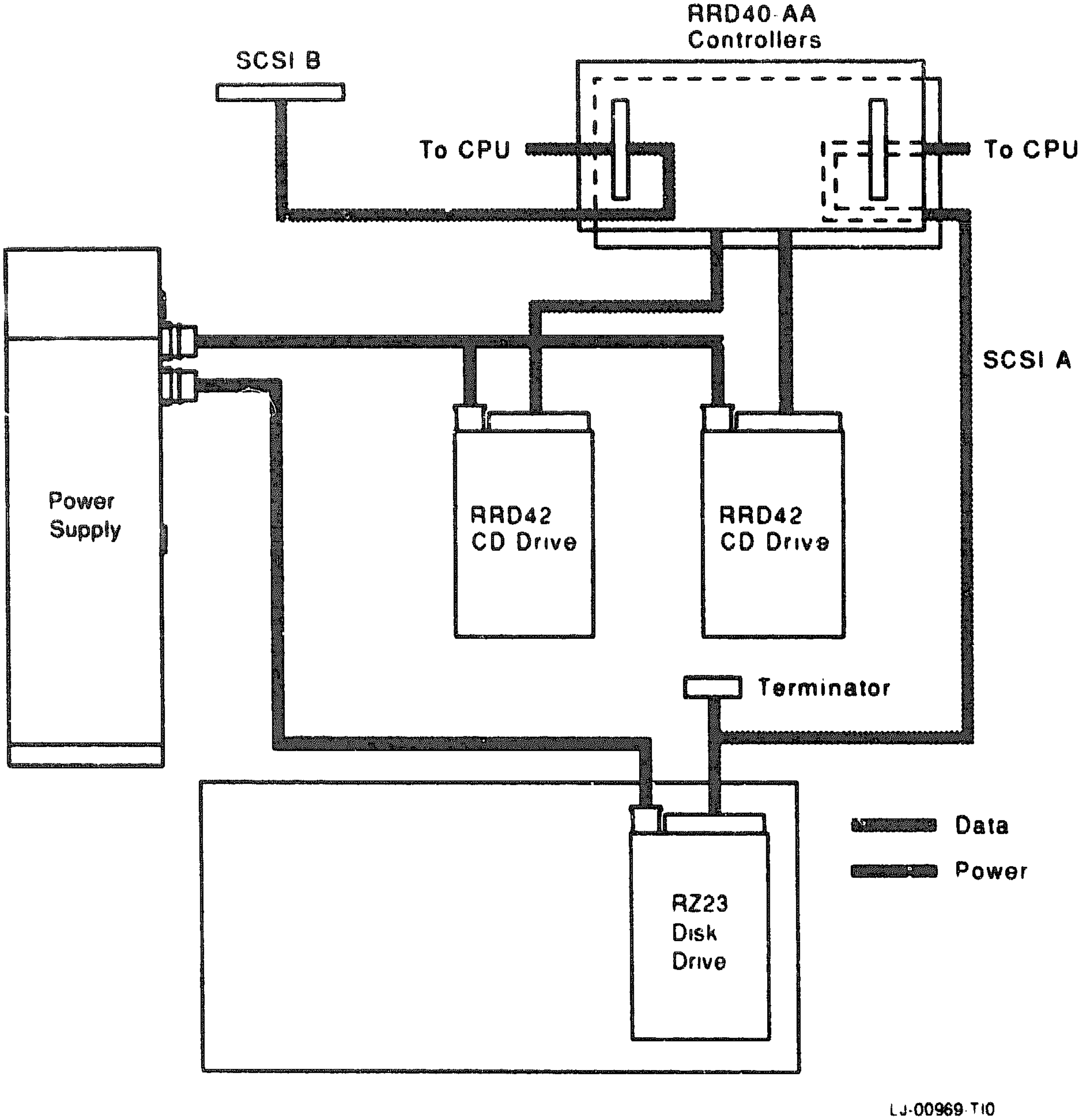
The modem port and MMJ Ports 2 and 3 are not used or supported by the server.

Ethernet Ports	Connection to the Ethernet network is done through either the Standard Ethernet connector or through the ThinWire Ethernet connector. The position of the Network Select Button determines which port is enabled. An LED is lit beside the enabled port. Each port provides IEEE 802.3 network communications.
SCSI Connector	The external Small Computer Systems Interconnect (SCSI) port is used to connect external mass storage devices to the system. You can connect up to six external drives to the server.
Break Enable Switch	The position of the Break Enable Switch at power up determines the function of the terminal attached to MMJ Port 1. When the switch is up, you can press the Break key on the console to enter console mode directly.
Power Supply	The power supply accepts inputs in the ranges of 100 Vac to 120 Vac and 200 Vac to 240 Vac, at 50 or 60 Hz. A selection switch is not needed.

8.2 RRD40 or RRD42 CD Drives

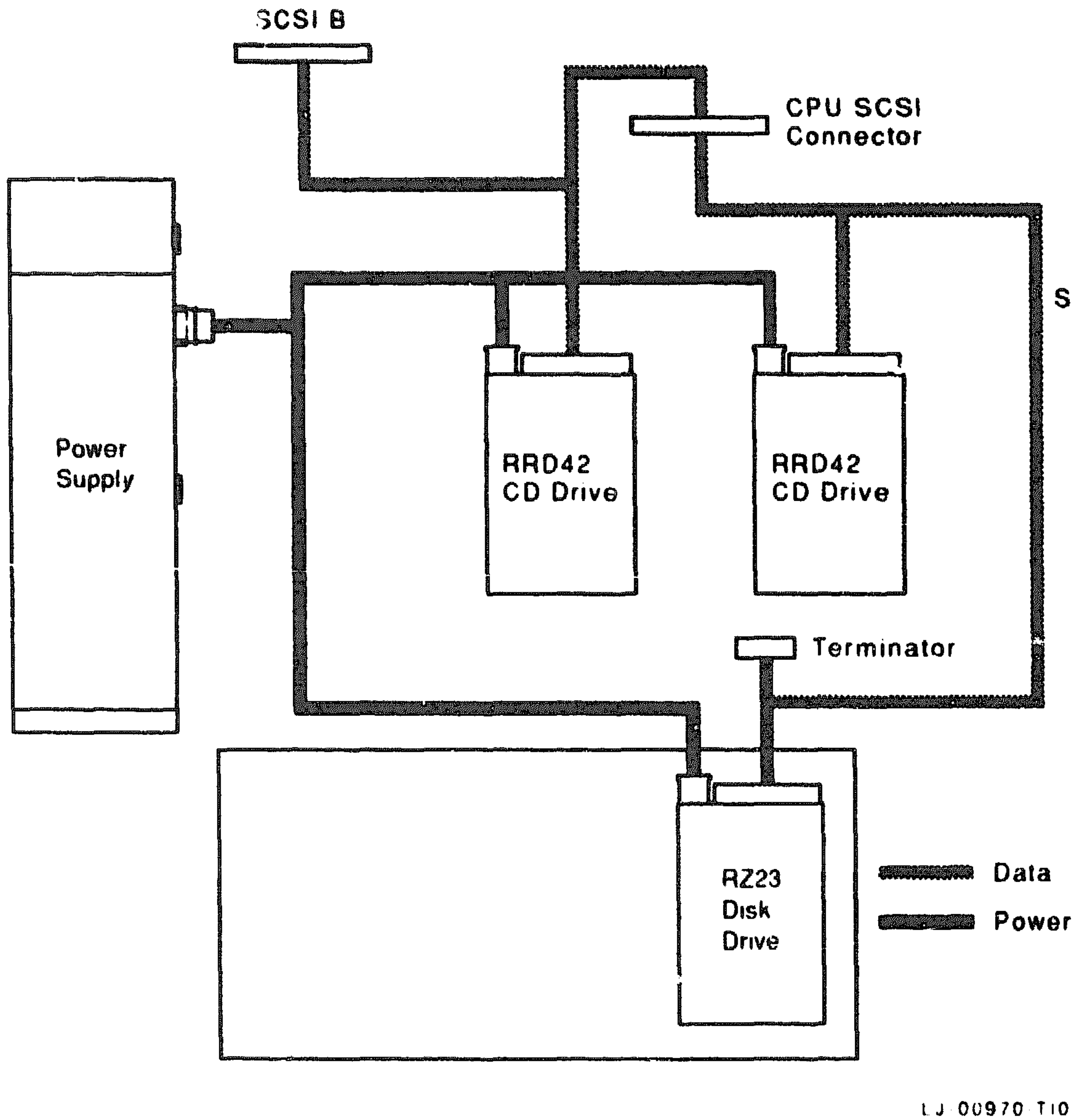
The RRD40 CD drives are used on earlier models. Each drive requires an RRD40 controller module. Either one or two CD drives can be installed on the lower drive mounting panel. The right-hand drive (as viewed from the front) is connected to the SCSI-A bus; the left-hand drive is connected to the SCSI-B bus. Figure 8–3 shows the drive mounting panel power and signal cabling for -AX Models.

Figure 8–3 Power and Signal Cabling for -AX Models



The RRD42 CD drive is used on later models. It has an integral controller, so no external module is needed. Figure 8–4 shows the power and signal cabling for -BX and -CX Models.

Figure 8–4 Power and Signal Cabling for -BX and -CX Models



8.3 FRU Removal and Replacement

This section describes the removal and replacement procedures for the FRUs in the InfoServer 100 system. For removal procedures that are the same as the MicroVAX 3100 Model 20, a reference is made to that procedure in Chapter 5, rather than repeating it here.

Refer to Table 8–2 to find the name of the FRU that needs replacing; then go to the section listed opposite the FRU entry. Follow the steps in the section to remove the FRU, and reverse the procedures to replace the FRU. Test the replaced device for correct operation.

CAUTION

Wear a static wrist strap and use a static mat when replacing FRUs.

Table 8–2 InfoServer 100 FRU Section Listing

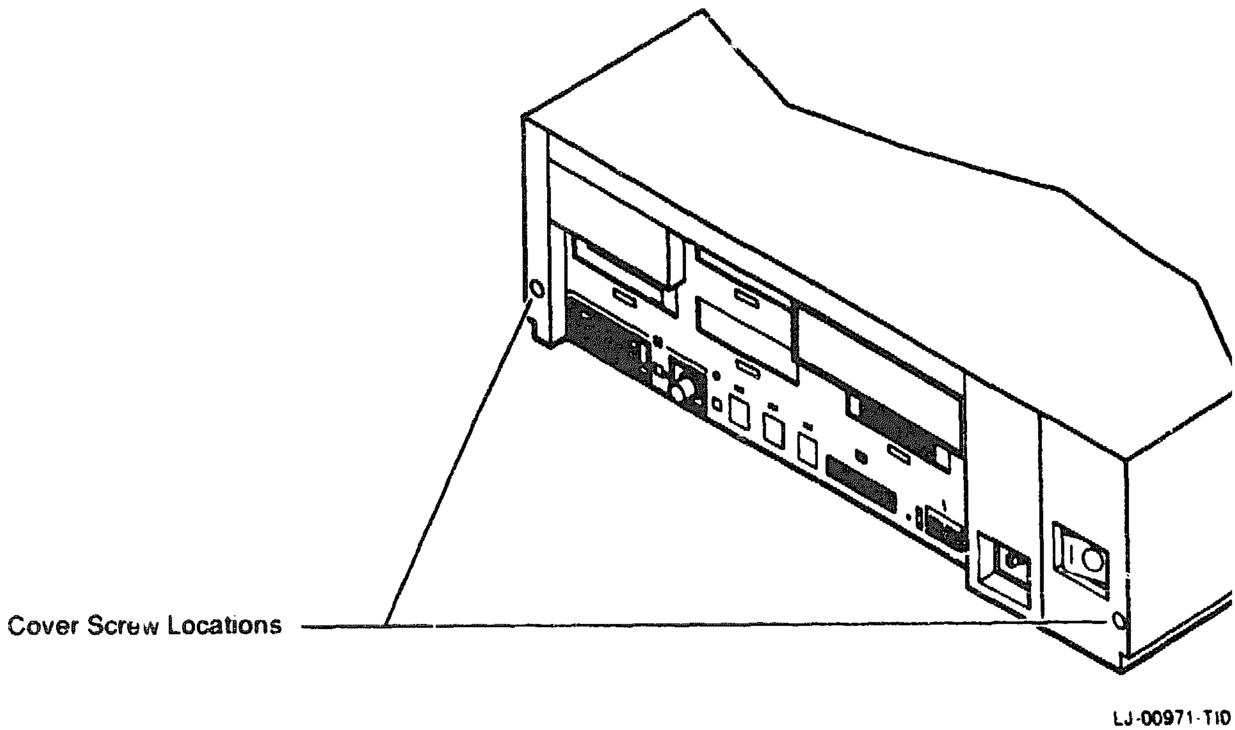
FRU	Section
Cover	Section 8.3.1
Upper drive mounting panel	Section 8.3.2
RRD40 controller	Section 8.3.3
Lower drive mounting panel	Section 8.3.4
CD Drive Removal	Section 8.3.5
RRD42 CD Drive Removal	Section 8.3.6
RZ23 disk drive	Section 8.3.7
System module	Section 8.3.8
Battery pack	Section 8.3.9
Power supply	Section 8.3.10

8.3.1 System Box Cover Removal

Remove the system box cover as follows:

1. Turn the system power switch off.
2. Disconnect all the cables connected to the system unit.
3. Loosen the two cover screws on the rear panel of the system box. See Figure 8–5.
4. Slide the cover forward and up off the system box.

Figure 8–5 Cover Screw Locations



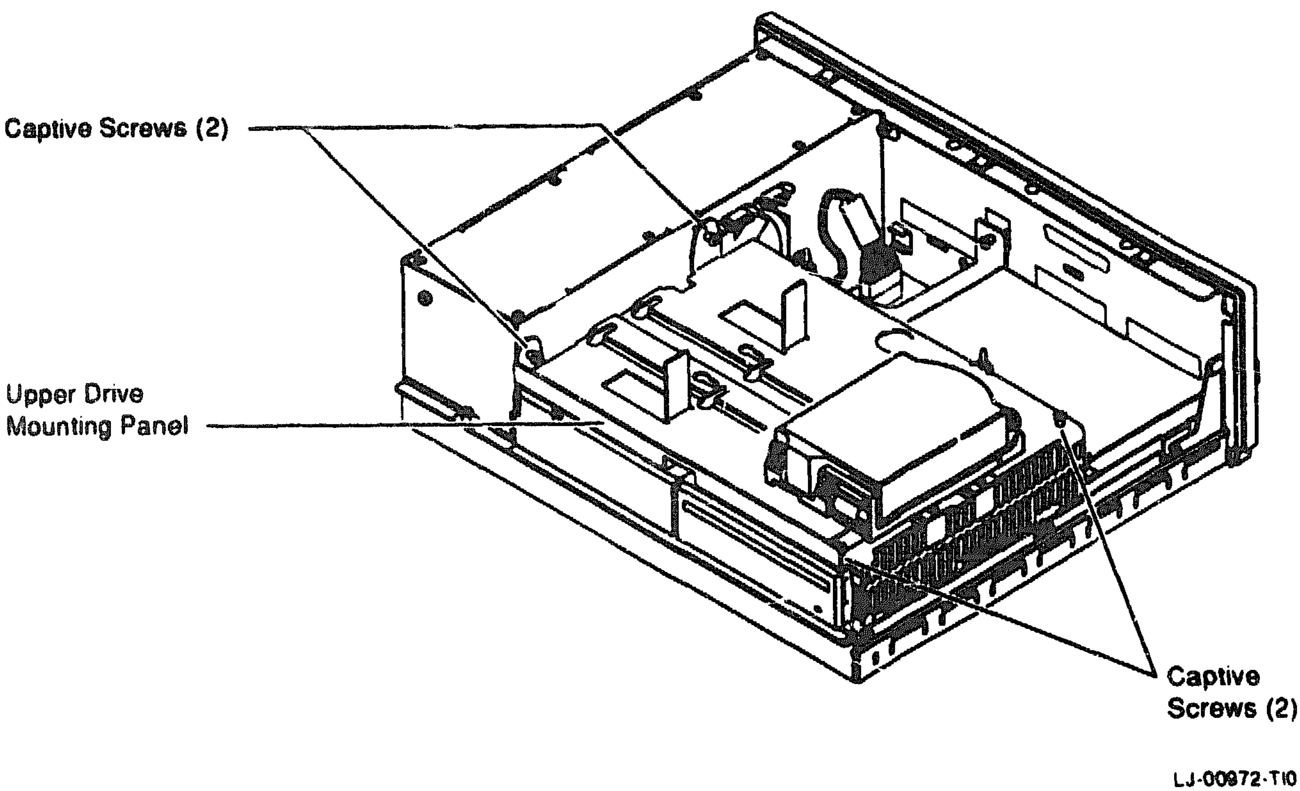
8.3.2 Upper Drive Mounting Panel Removal

The upper drive mounting panel contains the RZ23 hard disk drive.

Remove the upper drive mounting panel as follows:

1. Remove the system box cover. See Section 8.3.1.
2. Disconnect the power cables and the SCSI bus cable from the RZ23 on the upper drive mounting panel.
3. Unscrew the four captive screws. See Figure 8–6.
4. Lift the upper drive mounting panel from the lower drive mounting panel and gently set it aside.

Figure 8–6 Unscrewing the Upper Drive Mounting Panel



8.3.3 Removing the RRD40 Controller(s) (If present)

InfoServer 100 model SEABB-AX has one RRD40 controller module. Model SEABC-AX has two controller modules, one mounted component side up, the other mounted component side down on top of the other using a standoff.

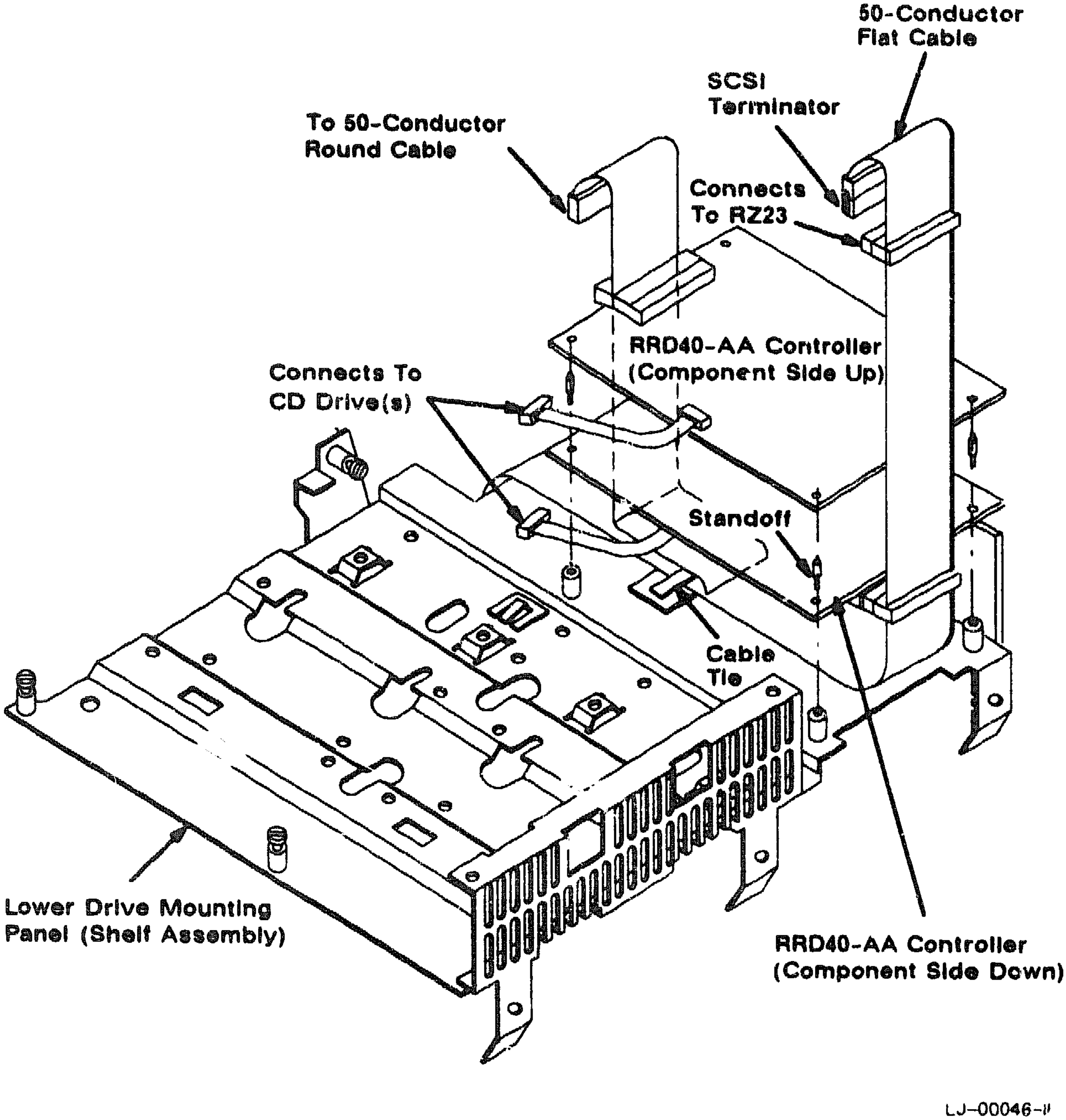
CAUTION

Note which cable connectors connect to which drive and connector before disconnecting them. To help in reassembly, use a piece of tape on each connector and cable and note its position before disconnecting the cable.

Use the procedure that follows to remove the RRD40 controllers. If your unit only has one controller, skip steps that do not apply.

1. Remove power and data (50-pin) from RZ23.
2. Remove the upper drive mounting panel (Section 8.3.2).
3. Disconnect the cable(s) from the RRD40 CD drive(s).
4. Disconnect the 50-conductor, flat cable from the top RRD40 controller.
5. If replacing the cable, remove the SCSI terminator from the end of the cable and install it on the new cable.
6. Loosen the top RRD40 controller module from the standoffs at each corner and lift off the controller module.
7. Unscrew the standoffs from the corners of the lower RRD40 controller module.
8. Disconnect the flat cable from the bottom RRD40 controller module.

Figure 8–7 Removing the RRD40 Controller Module(s)



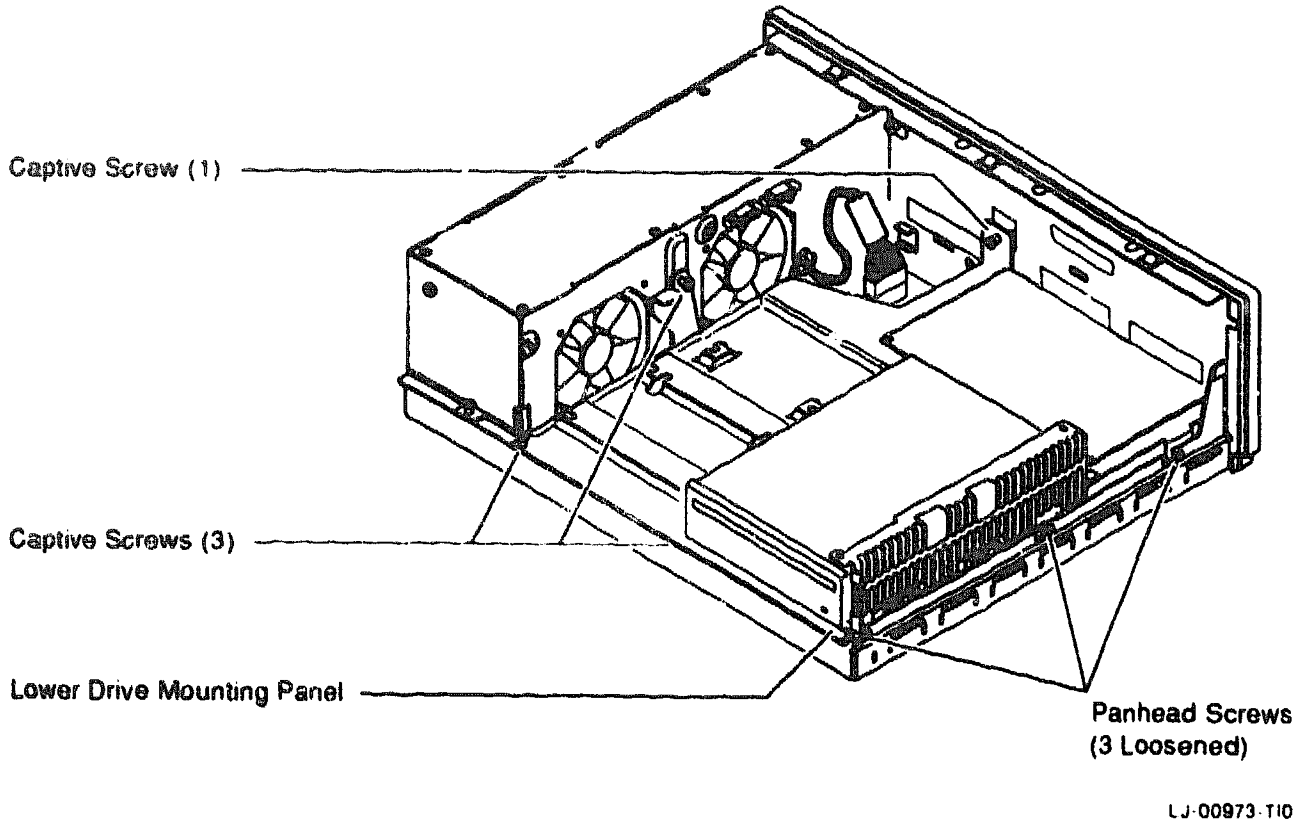
8.3.4 Lower Drive Mounting Panel and CD Drive Removal

The lower drive mounting panel contains either one or two RRD40 CD drives or one or two RRD42 CD drives, depending on the model of the InfoServer 100 system. See Table 8–1.

Remove the lower drive mounting panel as follows:

1. Remove the upper drive mounting panel if not already removed. See Section 8.3.2.
2. Disconnect the SCSI and power cables connected to the drives on the lower drive mounting panel (Figure 8–8).
3. Unscrew the seven screws.
4. Slide the panel forward with the CD drives attached; then, lift the panel from the system box and gently set it aside.

Figure 8–8 Removing the Lower Drive Mounting Panel



8.3.5 Remove the CD Drives from the Lower Drive Mounting Panel

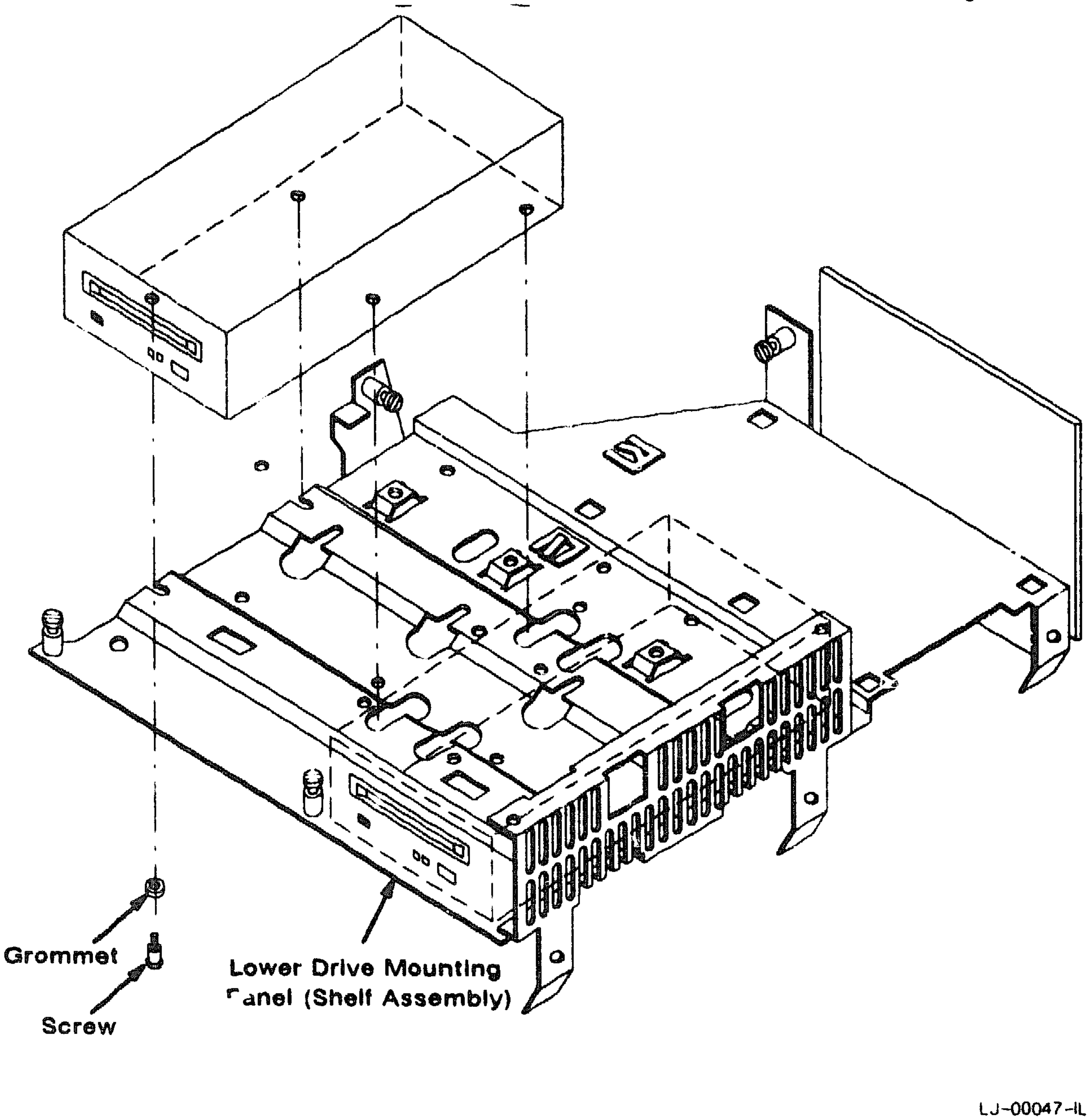
Use the following procedure to remove the CD drives from the lower drive mounting panel.

1. Remove the outer two screws and grommets that secure the CD drive to the lower drive mounting panel. See Figure 8–9.
2. Loosen the inner two screws that secure the CD drive.
3. Slide the drive backward and lift it out of its slots on the lower drive mounting panel.

NOTE

When installing the new CD drive, make sure you install the rubber grommets on each screw before installing the screws. The grommets may have stuck to the drive mounting panel.

Figure 8–9 Removing CD Drive from the Lower Drive Mounting Panel



8.3.6 RRD42 CD Drive Removal

Remove the RRD42 CD drive as follows:

1. Remove the upper drive mounting panel if not already removed. See Section 8.3.2.
2. Disconnect the SCSI and power cables connected to the drive on the lower drive mounting panel.
3. Remove the CD drive(s) per Section 8.3.5.

8.3.7 RZ23 Disk Drive Removal

An RZ23 hard disk drive is installed on the upper drive mounting panel. The RZ23 contains a drive module/frame, which must be removed before replacing the drive. The head/disk assembly inside the drive is not a FRU, so replace the drive as one FRU.

Refer to Chapter 5, Section 5.2.5, for removal of the RZ23 disk drive and drive module/frame.

8.3.8 System Module Removal

The InfoServer 100 system module (KA41-CA) is removed using the same procedure as that of the MicroVAX 3100 or the VAXserver 3100 Model 20 system module, so you can use that procedure to remove the KA41-CA system module. Install the new board as is; no jumpers or switches need to be changed. See Chapter 5, Section 5.2.10.

8.3.9 Battery Pack Removal

See Chapter 5, Section 5.2.11.

8.3.10 Power Supply Removal

See Chapter 5, Section 5.2.12.

A
Console Test Commands

There are two types of console test commands, diagnostic test commands and utility commands. Table A–1 gives a complete list of the diagnostic test commands. See Chapter 1 for a detailed description of these commands. Table A–2 gives a complete list of the utility commands. See Chapter 3 for a detailed description of these commands.

Table A–1 Diagnostic Test Commands

Test	Description
T F	Self-test for future option—no test run.
T E	Self-test on time-of-year clock (CLK).
T D	Self-test on nonvolatile RAM (NVR).
T C	Self-test on serial line controller (DZ).
T B	Self-test on system memory (MEM).
T A	Self-test on memory management unit (MM).
T 9	Self-test on floating point unit (FP).
T 8	Self-test on interval timer (IT).
T 7	Self-test on the SCSI-A bus.
T 6	Self-test on the SCSI-B bus.
T 5	Self-test on interrupt controller and Ethernet ID ROM (SYS).
T 4	Test DSH32-B communications module async. lines.
T 3	Test DSH32-B communications module sync. lines.
T 2	Self-test for future option—no test run.

Table A–1 (Cont.) Diagnostic Test Commands

Test	Description
T 1	Self-test on the Ethernet circuits (NI).
T 0	Customer mode system exerciser.
T 101	Field Service mode system exerciser (two passes).
T 102	Field Service mode system exerciser (continuous).
T 80000103	Manufacturing mode system exerciser.
T 80000106	Selects individual devices for exerciser tests.

Table A–2 Utility Commands

Test	Description
T 50	Configuration display.
T 51	Set NVR default boot device.
T 52	Set NVR default boot flags.
T 53	Set NVR default recovery action flags.
T 73	Special key on CompacTapes.
T 74	Special key on diskettes.
T 75	SCSI disk data eraser.
T 76	SCSI diskette formatter.

B
Console Commands

B.1 Console Command Syntax

- The console program accepts commands up to 80 characters long. Longer commands result in an error message. The character count does not include rubouts, rubbed-out characters, or the terminating RETURN.
- Type-ahead is not supported. The system disregards most characters received before the console prompt (>>>) appears on the screen. The following control sequences are exceptions: CTRL/S, CTRL/Q, and CTRL/C.
- Commands can be abbreviated by typing the first character in the command name. Most commands are recognized by their first character. For example, B stands for the BOOT command and T stands for the TEST command. The exceptions are DT[E], HE[LP], SE[T], and SH[OW].
- The console program treats multiple adjacent spaces and tabs as a single space. Leading and trailing spaces and tabs are ignored.
- Command qualifiers can appear after the command keyword or after any symbol or number in the command.
- All numbers (addresses, data, and counts) are hexadecimal except for symbolic register names which are decimal.
- The console program accepts uppercase and lowercase letters.

B.2 Console Commands

The following sections describe the console commands:

B.2.1 BOOT

>>> BOOT [<qualifier>][<device_name>]

The boot program is called Virtual Machine Boot (VMB). The console program intializes and starts VMB running.

Qualifier

/R5:<data> - After initializing the processor and before starting VMB, R5 is loaded with the specified data (in hexadecimal). This allows a console user to pass a parameter to VMB.

Device_name

VMB boots the operating system from the device specified in the <device_name>. The device_name is in the form LLLD, where the first three characters are uppercase letters and the fourth character is a digit (0 through 9). A terminating colon in the device_name is acceptable, but is not required. Devices for MicroVAX 3100 and VAXserver 3100 systems are listed as follows:

Table B–1 System Device Names

Name	Description
DKAx00	RZ23 on SCSI-A bus at address ID x (0 to 7)
MKAx00	TZ30 on SCSI-A bus at address ID x (0 to 7).
DUAx	RX23 on SCSI-A bus at address ID x (0 to 7).
ESA0	Ethernet booting device.
DKBx00	RZ23/RZ55 on SCSI-B bus at address ID x (0 to 7).
MKBx00	TK50Z on SCSI-B bus at address ID x (0 to 7).
DUBx	RX23 on SCSI-B bus at address ID x (0 to 7).

Enter the SHOW DEVICE command to see the list of devices installed in the system.

If no device_name is specified, the console program automatically assigns ESA0 as the boot device and sends out a boot inquiry over the Ethernet once every 30 seconds for 5 minutes. If no host responds within the first 5 minutes, the console program waits for 5 minutes without sending out a boot inquiry. The console program then starts sending a boot inquiry again every 30 seconds for 5 more minutes. This pattern is repeated until a host boots the node or until you press the halt button.

B.2.2 COMMENT

>>> ! <comment>

The COMMENT command (the exclamation point) is ignored by the console program. It is used to annotate console I/O command sequences.

B.2.3 CONTINUE

>>> CONTINUE

The processor begins instruction execution at the address currently contained in the program counter. The address in the program counter is the address that was saved when the console program was started or is the address that was entered by the operator using the DEPOSIT command. Processor initialization is not performed. The console program enters program I/O mode (operating system such as VMS or Ultrix).

B.2.4 DEPOSIT

>>> DEPOSIT [<qualifier>] <address><data>

Deposits the data into the specified address. If no address space or data size qualifiers are specified, the defaults are the address space and data size used in the last DEPOSIT or EXAMINE command. After processor initialization, the default address space is physical memory, the default address is zero, and the default data size is longword.

Qualifiers

- /B — The data size is byte.
- /W — The data size is word.
- /L — The data size is longword.

- /V — The address space is virtual memory. If memory mapping is not enabled, virtual addresses are equal to physical addresses.
- /P — The address space is physical memory.
- /I — The address space is internal processor registers.
- /G — The address space is the general registers (R0 through R15).
- /M — The address space is the machine register.
- /U — Enables access to console program memory.
- /N:<count> — The address is the first address in a range of addresses specified in count. The console program deposits the <data> to the first address and then to the specified number of succeeding addresses. Even if the address is the symbolic address "-", the succeeding addresses are at the larger addresses. The symbolic address specifies only the starting address, not the direction of succession. For repeated references to preceding addresses, use "Repeat Deposit - <data>".

Address

- Processor status longword (PSL) — The address space is set to /M automatically. Do not specify any address space qualifiers with PSL.
- Program counter (PC) (general register R15) — The address space is set to /G automatically.
- Stack pointer (SP) (general register R14) — The address space is set to /G automatically.
- General register (RN) — The register number is in decimal. The address space is /G.
- + (plus) — The location immediately following the last location referenced in a DEPOSIT or EXAMINE command. For references to physical or virtual memory spaces, the location referenced is the last address *plus* the size of the last reference (1 for byte, 2 for word, 4 for longword). For other address spaces, the address is the last address referenced *plus* one.

- - (minus) — The location immediately preceding the last location referenced in a DEPOSIT or EXAMINE command. For references to physical or virtual memory spaces, the location referenced is the last address *minus* the size of this reference (1 for byte, 2 for word, 4 for longword). For other address spaces, the address is the last address referenced *minus* one.
- * (asterisk) — The location last referenced in a DEPOSIT or EXAMINE command.
- @ (at sign) — The location addressed by the last location referenced in a DEPOSIT or EXAMINE command.

Data

- The data is specified as a hexadecimal number. The default number is zero.

B.2.5 DTE

>>> DTE

Converts the system into a dumb terminal emulator connected over a serial line. This command is used when the boot node (server) needs a remote operator's console to run tests, boot the system, or whatever the regular operator's console is used for. If the boot node is a VAXserver 3100, the Break Enable switch on the back of the system box must be set to the up position before entering this command on the remote console. The boot node must also be plugged into port 3 on the back of the system box.

An * is added to the console prompt (>>>) when the DTE command is entered to indicate that you are operating the boot node. Press CTRL/P at the special console prompt (*>>>) to return to normal console mode.

B.2.6 EXAMINE

>>> EXAMINE [<qualifier>] [<address>]

Examines the contents of the specified address. If no address is specified + is assumed. The address may also be one of the symbolic addresses described in deposit.

Qualifiers

Same qualifiers as deposit.

Address

Same address specifications as deposit.

The response is in the form: <address space><address><data>

B.2.7 FIND

>>> FIND [<qualifier>]

The console program searches main memory starting at address zero for a page-aligned 128 Kbyte segment of good memory or a restart parameter block (RPB). If the segment or block is found, its address plus 512 is left in the SP. If the segment or block is not found, an error message is issued and the contents of the SP are unpredictable. If no qualifier is specified, /MEMORY is assumed.

Qualifiers

- /Memory

  Searches memory for a page-aligned 64 Kbyte segment of good memory. The search includes a read/write test of memory and leaves the contents of memory unpredictable.

- /RPB

  Searches memory for a restart parameter block. The search leaves the contents of memory unchanged.

B.2.8 HALT

>>> HALT

A halt message is displayed, followed by the console prompt (>>>). No action is taken.

B.2.9 HELP

>>> HELP

Brings up a summary of the console commands, supported parameters, and available options.

B.2.10 INITIALIZE

>>> INITIALIZE

A processor initialization is performed. Refer to Table B–2 for a list of registers that are set and the values they are set to (all values are hexadecimal).

Table B–2 INITIALIZE Command Register Values

Register	Value	Register	Value
PSL	041F.0000	IPL	1F
ASTLVL	4	SISR	0
ICCS	0	MAPEN	0

All other registers are unpredictable.

The defaults used to fill in unsupplied qualifiers for DEPOSIT and EXAMINE commands are set to physical address, longword size, and address 0.

B.2.11 REPEAT

>>>REPEAT <command>

The console program repeatedly displays and executes the specified command. The repetition is stopped when you type CTRL/C. Any valid console command may be specified for the command with the exception of the REPEAT command.

B.2.12 SET

>>> SET <parameter-name> <value>

Set the console NVR parameter to the indicated value. The following console parameters and their acceptable values are defined:

Parameter-name

- BOOT — Set the default boot device. The value must be a valid boot device name as specified by the boot command. See Section B.2.1. The only validation done is to verify that the fourth character in the device name is a decimal number between zero

and nine. Entering "." resets the boot device to the default value which is ESA0.

- BFLG — Set the default boot flags. The value must be a hexadecimal number of up to eight characters. The value entered is not checked for validity.
- HALT — Set the default halt action code. This code specifies the default action the console should take for all error halts and power up halts. The default value is stored in nonvolatile RAM and is retained across power cycles. If the nonvolatile RAM fails for any reason, the console initializes this field to the value of 2 (boot).

  Value

  - 1 sets the default action to restart.
  - 2 sets the default action to boot.
  - 3 sets the default action to halt.
- MOP — Set the network listener to be enabled or disabled. The only acceptable values for this are listed as follows. If the Ethernet self-test had failed, then this command is an illegal command. If the nonvolatile RAM fails for any reason, the default value is set to 1 (enabled).

  Value

  - A 0 disables the network listener.
  - A 1 enables the network listener.
- PSWD — Set the password for remote trigger verification. This allows a user to set the password that will be verified if a remote trigger is received by the network listener. An illegal command will be displayed if the Ethernet self-test has failed or remote triggers are not enabled. In order to set a new password, the password must be known unless it is the first time a password is set, in which case only a new password need be specified. There is no corresponding SHOW command. For security reasons, the password is one-way encrypted and cannot be displayed.

- SCSIA — Set the SCSI address ID of the SCSI-A bus controller. The address ID of the bus controller should be an ID of 6. However, the address ID can be changed for whatever reason using this command. Valid address IDs are 0 to 7. Enter SCSIA 6 at the console prompt to set the bus controller's ID to 6.
- SCSIB — Set the SCSI address ID of the SCSI-B bus controller. The address ID of the bus controller should be an ID of 6. However, the address ID can be changed for whatever reason using this command. Valid address IDs are 0 to 7. Enter SCSIB 6 at the console prompt to set the bus controller's ID to 6.
- TRIG — Set the remote trigger to be enabled or disabled. This allows a remote system to request a local boot of the system. If the Ethernet self-test has failed, then this is an illegal command. If the nonvolatile RAM fails for any reason, the default value is set to 0 (disabled, remote trigger is not allowed).

B.2.13 SHOW

>>> SHOW <parameter-name>

The SHOW command displays information about the parameter indicated.

Parameter-name

- BOOT — Displays the default boot device as defined in the previous SET command above. An empty field appears as "....".
- BFLG — Displays the default boot flags. If no flags are specified, then 00000000 is displayed.
- DEVICE — Displays the devices currently operating in the system including the drives and their SCSI address IDs on the SCSI buses.
- ESTAT — Displays the screens associated with the last execution of the system exerciser test. This command is provided as a means of determining the state of the system test if an abnormal error occurs which causes the system exerciser test to either wait or halt. It provides no more information than is available at the normal completion of the system exerciser test.
- ETHERNET — Displays the hardware Ethernet address. The Ethernet address ROM is validated and is displayed as ID YY-YY-YY-YY-YY-YY where YY is a valid two digit hexadecimal number.

If the Ethernet address ROM is invalid, then ID XX-XX-XX-XX-XX-XX is displayed to indicate that the Ethernet address ROM is not valid.

- HALT — Displays the default action code.
- MEM — Displays information concerning the KA-41 system memory. The format of the display is as follows:

```
>>> SH MEM
    00400000
    00000000
    003FD400:003FFFFF
```

Where: The first eight-character field displays the total amount of memory in the system including the console data structures. The second eight-character field shows the first address of 256 Kbytes of contiguous memory, generally used by VMB. The final line of the display shows the address range of the area of memory that is not available to the operating system. This includes the area of memory that is reserved for use by the console program. This field will be repeated as many times as needed to display all of the address ranges that are not available to the operating system.

- MOP — Displays the state of the enabled network listener bit. If the value returned is 0, then the network listener is disabled. If the state of the value returned is 1, then the listener is enabled. If the Ethernet tests fail, then this command is an illegal command.
- SCSIA — Displays the host ID to be used by the SCSI-A bus (0 to 7).
- SCSIB — Displays the host ID to be used by the SCSI-B bus (0 to 7).
- TRIG — Displays the state of remote trigger enable. If the value returned is 0, then a remote trigger is not allowed. If the state of the returned is 1, then remote triggers are allowed provided the remote trigger password is set correctly. If the Ethernet tests fail, then this command is an illegal command.
- VER — Displays information concerning the revision levels of four separate sections of program code within the system module ROMs. These sections are the self-test code, console code, VMB code, and the ROM code. All four sections have different internal revision levels. Enter SHOW VER to see the internal revision levels of the self-test, console, VMB, and ROM code displayed

next to the KA41-A. The following is an example of these revision levels:

```
>>> SHOW VER

KA41-A V0.17C-0BF-V2.1-239
       PST: 0BF
       CON: 17C
       VMB: V2.1
       ROM: 239
```

Where: The V0.17C is for the self-test revision level, 0BF is the console code revision level, V2.1 is for the VMB revision level, and 239 is the ROM code revision level.

B.2.14 START

>>> START [<address>]

The console program starts instruction execution at the specified address. If no address is given, the current content of the PC is used. The START command is equivalent to a deposit to PC followed by a CONTINUE command. No initialize is performed.

B.2.15 TEST

>>> TEST [<test number>]

The console program invokes a diagnostic test program specified by the test number. Test numbers for Field Service diagnostics are rejected if loopback connectors are not installed on all MMJ connectors. Some of the test numbers are used to invoke utilities. See Appendix A for a list of the test numbers.

B.2.16 UNJAM

>>> UNJAM

A system reset is performed.

B.2.17 Transfer (XFER)

>>> X <address><count><RETURN><data stream><checksum>

Transfers binary data to and from physical memory. This command is used by automatic systems communicating with the console program. It is not intended for operator use. The console program writes or reads in memory the specified number of data bytes, starting at the specified address.

Address

The physical address the binary data is transferred to or from. It is specified as a hexadecimal number.

Count

The number of bytes to be transferred. It is specified as a hexadecimal number. If the high order bit of the count is one, the data is transferred (read) from physical memory to the console device. If the high order bit is zero, the data is transferred (written) from the console device to physical memory.

RETURN

A carriage return.

Data stream

"Count" bytes of binary data.

Checksum

The two's complement checksum of the command string or data stream. The checksum is one byte of data expressed as a two digit hexadecimal number.

B.3 Special Keys

Table B–3 Special Keys Used In Console Program Mode

Special Key	Explanation of use
RETURN	Terminates the command line so the console program can execute the command.
⌫ DELETE	This is used to delete single characters within a command line. On video terminals and video monitors, the character(s) deleted disappears (the console program sends a BS/SP/BS). On hardcopy terminals, the deleted characters are retyped after a backslash delimiter as they are deleted. For unknown attached console devices, the console program assumes they are hardcopy.
CTRL/C	Aborts the current command. The current program mode PC will be displayed, and the console prompt (>>>) is displayed on the next line. The console program echoes this as ^C.
CTRL/O	Causes the console program to throw away transmissions to the console device until the next CTRL/O is entered. CTRL/O is echoed as ^O when it disables output, but is not echoed when it reenables output. Output is reenabled if the console program prints an error message or if the console prompts for a command from the console device. Output is also enabled by entering program I/O mode, and by CTRL/C. CTRL/O clears CTRL/S.
CTRL/R	Retypes the current command line. Deleted characters are not displayed.
CTRL/S and CTRL/Q	The console program supports CTRL/S and CTRL/Q on both the normal and attached console devices. These keys are equivalent to the corresponding line pacing control characters XOFF and XON. Characters received between the XOFF/XON pair may be ignored. The hold screen key on the normal console device is not used for line pacing.
CTRL/U	Ignores the current command line. The console prompt (>>>) is displayed on the next line. This only affects entry of the current line. The console program echoes this as ^U. Pressing CTRL/U when a command is executing does not abort the command.

NOTE

Special keys are ignored during TRANSFER.

C Console Messages and Explanations

Table C–1 Console Error Messages

Message	Explanation
02 EXT HLT	External halt.
04 ISP ERR	Attempt to push interrupt or exception state onto the interrupt stack when the interrupt stack is mapped NO ACCESS or NOT VALID.
05 DBL ERR1	A second machine check occurred while the processor was attempting to report a machine check to the operating system.
06 HLT INST	The processor executed a halt instruction in kernal mode.
07 SCB ERR3	SCB interrupt vector bits <1:0> = 3.
08 SCB ERR2	SCB interrupt vector bits <1:0> = 2.
0A CHM FR ISTK	A change mode instruction was executed when PSL<IS> was set.
0B CHM TO ISTK	Exception vector bit <0> was set for a change mode.
0C SCB RD ERR	A hard memory error occurred during a processor read of an exception or interrupt vector.
10 MCHK AV	An access violation or invalid translation occurred during machine check exception processing.
11 KSP AV	An access violation or invalid translation occurred during invalid kernel stack pointer exception processing.

Table C–1 (Cont.) Console Error Messages

Message	Explanation
12 DBL ERR2	Double machine check error.
13 DBL ERR3	Double machine check error.
19 PSL EXC5	PSL26:24 = 5 on interrupt or exception.
1A PSL EXC6	PSL26:24 = 6 on interrupt or exception.
1B PSL EXC7	PSL26:24 = 7 on interrupt or exception.
1D PSL EXC7	PSL26:24 = 5 on rei.
1E PSL EXC7	PSL26:24 = 6 on rei.
1F PSL EXC7	PSL26:24 = 7 on rei.
20 TOY ERR	Time-of-year (TOY) clock failure.
21 CORRPTN	The console database is corrupted. The console simulates a power-up sequence and rebuilds its database.
22 ILL REF	The requested reference violates virtual memory protection and the address is not mapped. Either the reference is not valid in the specified address space or the value is not valid in the specified destination.
23 ILL CMD	The command string cannot be parsed.
24 INV DGT	A number has an invalid digit.
25 LTL	The command is too large for the console to buffer.
26 ILL ADR	The specified address is not in the address space.
27 VAL TOO LRG	The specified value does not fit in the destination.
28 SW CONF	Conflicting switches. For example, an EXAMINE command that specifies two different data sizes.
29 UNK SW	The switch is not recognized.
2A UNK SYM	The examine or deposit symbolic address is not recognized.
2B CHKSM	Either the whole transfer (X) command or just the <data> portion of the TRANSFER command is not valid.
2C HLTED	The operator entered the HALT command.

Table C–1 (Cont.) Console Error Messages

Message	Explanation
2D FND ERR	A FIND command failed to find either the RPB or 64 Kbytes of good memory.
2E TMOUT	Data failed to arrive in the expected time during a transfer (X) command.
2F MEM ERR	Parity or other memory error detected.
30 UNXINT	An unexpected interrupt or exception occurred.
40 NOSUCHDEV	VMB message: No bootable device found.
41 DEVASSIGN	Device is not present.
42 NOSUCHFILE	Program image is not found.
43 FILESTRUCT	Invalid boot device file structure.
44 BADCHKSUM	Bad checksum on header file.
45 BADFILEHDR	Bad file header.
46 BADIRECTORY	Bad directory file.
47 FILNOTCNTG	Invalid program image file.
48 ENDOFFILE	Premature end-of-file encountered.
49 VADFILENAME	Bad file name given.
4A BUFFEROVF	Program image does not fit in available memory.
4B CTRLERR	Boot device I/O error.
4C DEVINACT	Failed to initialize boot device.
4D DEVOFFLINE	Device is off-line.
4E MEMERR	Memory initialization error.
4F SCBINT	Unexpected SCB exception or machine check.
50 SCBZNDINT	Unexpected exception after starting program image.
51 NOROM	No valid ROM image found.
52 NOSUCHNODE	No response from load server.
53 INSFMAPREG	Invalid memory configuration.
54 RETRY	No devices bootable, retrying.
55 NOWRT	Device is read-only or write locked.

Table C–1 (Cont.) Console Error Messages

Message	Explanation
56 DUPIDENT	Duplicate SCSI ID for device and CPU.
57 DEVCMDERR	DEVICE command error.
58 ILLIOFUNC	Illegal I/O function.
81 SUCCESS	Success.
82 CVAXSTAR	Power-up message.
83 BOOT SASS	Bootstrapping.
84 FAIL	General failure.
85 RESTART SASS	Restarting system software.
86 RMT TRGGR	Remote trigger request.
87 TESTING_SP	A white space message to format countdown.
88 TESTING_DONE	Diagnostic conclusion.
89 IMPOSSIBLE	Operation is impossible.
8A PC_STR	PC introduction on halt display.
8B BKSP_DELETE	Backspace delete sequence.
8C CRLF	Simple CRLF.
8D CTRLC	Control C message.
8E CTRLU	Control U message.
8F CTRLO	Control O message.
90 DA_QUERY	Device attribute request.
91 TERMINIT	Terminal initialization.
92 APT_PROMPT	Prompt to APT.
93 LK201_RESP	Console language response prompt.
99 PROMPT	Console prompt text.
9A BOOTFILE	Bootfile prompt message.
9B PARMFILE	Ethernet parameter file prompt message.
9C RMT TRGGR	Bootstrap triggered remotely.

D

VMB Boot Error Status Codes

Figure D–1 shows the two types of VMB error displays. PC indicates the contents of the program counter at the time of the error, R0 indicates the contents of register 0 at the time of the error, and PSL indicates the contents of the program status longword. Table D–1 lists the VMB boot error status codes.

Each error code's lower three bits (hexadecimal) represent a severity level and may be changed by the software. For example, 000001F4 is a parity error and represents an error status, but 000001F0 through 000001F7 also represent parity errors of varying severity. Therefore, the error code numbers represent the typical value of each error code. Refer to Table D–1.

Figure D–1 VMB Error Displays

```
1) Generic error message where R0 is a status code.

 %VMB-F-ERR, PC = nnnnnnnn
 %VMB-I-STS, R0 = nnnnnnnn

2) Unexpected exception. These represent internal VMB errors.

 %VMB-F-SCBINT, PC = nnnnnnnn, PSL = nnnnnnnn
        OR

 %VMB-F-SCBINT2, PC = nnnnnnnn, PSL = nnnnnnnn
```

Table D–1 VMB Boot Error Status Codes

Error Code	Mnemonic	Definition
00000001	SS$_NORMAL	Normal successful completion.
00000054	SS$_CTRLERR	Fatal controller error.
00000084	SS$_DEVOFFLINE	Device is not in configuration or not available.
0000008C	SS$_DRVERR	Fatal drive error.
000000DC	SS$_ILLBLKNUM	Illegal logical block number.
000001A4	SS$_MEDOFL	Medium is off-line.
000001AC	SS$_NODATA	Mailbox is empty.
000001F4	SS$_PARITY	Parity error.
0000022C	SS$_TIMEOUT	Device timeout.
0000028C	SS$_NOSUCHNODE	Remote node is unknown.
000002AC	SS$_FILNOTCNTG	File is not contiguous as required.
00000344	SS$_INSFMAPREG	Insufficient map registers.
00000601	SS$_BUFFEROVF	Output buffer overflow.
00000808	SS$_BADCHKSUM	Bad file header checksum.
00000810	SS$_BADFILEHDR	Bad file header.
00000818	SS$_BADFILENAME	Bad file name syntax.
00000828	SS$_BADIRECTORY	Bad directory file format.
00000848	SS$_DEVASSIGN	Device has channels assigned.
00000870	SS$_ENDOFFILE	End of file.
000008C0	SS$_FILESTRUCT	Unsupported file structure level.
00000908	SS$_NOSUCHDEV	No such device available.
00000910	SS$_NOSUCHFILE	No such file.
000020D4	SS$_DEVINACT	Device is inactive.
00002144	SS$_FORCEDERROR	Forced error flagged in last sector read.
00008000	SS$_MEMERR	No good pages of memory found.
00008018	SS$_NOROM	System exerciser not present.

E
Power-Up and Self-Test Error Codes

This appendix lists all of the power-up and self-test error codes. There is no difference between the power-up error codes and the self-test error codes. Table E–1 lists the contents of this appendix by sections.

Table E–1 Failing Test/Device Section References

Failing Test/Device	Section
Test F - Not supported	–
Test E - TOY clock (CLK)	E.1
Test D - Nonvolatile RAM (NVR)	E.2
Test C - Serial line controller (DZ)	E.3
Test B - System memory (MEM)	E.4
Test A - Memory management (MM)	E.5
Test 9 - Floating point (FP)	E.6
Test 8 - Interval timer (IT)	E.7
Tests 6 and 7 - SCSI bus controller (SCSI-A and SCSI-B)	E.8
Test 5 - Interrupt controller and Ethernet ID ROM (SYS)	E.9
Test 4 - DSH32-B communications module async. lines	E.10
Test 3 - DSH32-B communications module sync. lines	E.11
Test 2 - Not supported	–

Table E–1 (Cont.) Failing Test/Device Section References

Failing Test/Device	Section
Test 1 - Ethernet network (NI)	E.12

E.1 Time-Of-Year Clock (CLK)

Error code format: 0000.XXXX

Where XXXX is one of the error codes. Refer to Table E–2.

Table E–2 Time-Of-Year Clock (0000.XXXX)

Error Codes	Definition
0001	No error.
0003	Tell dispatcher to check time at the end of the testing.
0004	Invalid time set.
0005	Clock has not been reset since the last time that battery voltage level was low.
0010	Failure in time-of-year test.
0020	Vrt bit failed to set after it was read the first time.
0040	Battery voltage level was down during the clock test.

E.2 Nonvolatile RAM (NVR)

Error code format: 0000.XXXX

Table E–3 lists the codes corresponding to XXXX. An error code of 5 indicates that the battery voltage is below an acceptable level for data in the NVR to be valid.

Table E–3 Nonvolatile RAM Error Codes (0000.XXXX)

Error Codes	Definition
0001	No error.
0004	Battery was down at last entry.
0008	NVR failed.
0080	The battery check code in the NVR did not agree with the expected check code.

E.3 Serial Line Controller (DZ)

Error code format: 0000.XXXX

Table E–4 lists the error codes corresponding to XXXX.

Table E–4 Serial Line Controller (0000.XXXX)

Error Codes	Definition
0001	No error.
0002	Master reset failed.
0004	Failure in basic CSR test.
0008	Failure in CSR read write test.
0010	Basic test of TCR failed.
0020	Read write test of TCR failed.
0040	Transmitter ready test failed.
0080	Receiver ready test failed.
0100	Transmitter interrupt timeout.

Table E–4 (Cont.) Serial Line Controller (0000.XXXX)

Error Codes	Definition
0200	Receiver interrupt timeout.
0400	Either transmitter or receiver interrupted at the wrong priority.
0800	Receiver interrupt occurred when the receiver was not enabled.
1000	Data comparison error.
2000	Overrun error did not happen.
4000	This line is untested.
8000	Error in the modem control logic test.

The second line of six codes under the DZ error code contains the status of each serial line. This line of status codes is provided so a failing serial line can be isolated. The status codes in the second line have the following format:

```
OOOOWWWW OOOOWWWW OOOOWWWW OOOOWWWW 00000000 00000000
line 1   line 2   modem    line 3   Unused   Unused
```

Table E–5 lists the codes corresponding to WWWW.

Table E–5 Serial Line Status Codes (0000WWWW)

Status Code	Definition
0001	Serial line tested successfully.
4000	Serial line is untested.

E.4 System Memory (MEM)

Error code format: 0000.XXXX

Table E–6 lists the codes corresponding to XXXX. These codes show the error/status information for the memory on the system module and also the option memory module. The second line under the MEM code contains additional information on the memory in the system. These additional codes have the following format:

Second line status code format: YYYYYYYY ZZZZZZZZ

Where YYYYYYYY is the total number of bytes of good memory found in the system. If this field is not in an even megabyte value (for example, 00020000) then the second field, ZZZZZZZZ, is displayed to indicate the failing megabyte bank. Each bit in the ZZZZZZZZ status code indicates the status for one bank of memory. In some cases, where a parity error is detected, the error may be on both the system module and the option memory module.

Table E–6 System Memory Error Codes (0000.XXXX)

Error Codes	Definitions
0001	No error.
0002	Failure in test address routine.
0004	Byte mask failure.
0008	Data/address test failure.
0010	No memory was found during sizing.
0020	Unexpected parity error.

E.5 Memory Management (MM)

Error code format: 0000.000X

Table E–7 lists the codes corresponding to X.

Table E–7 Memory Management Error Codes (0000.000X)

Error Codes	Definition
1	No error.
4	Memory management error.
8	Illegal vector during MM test.

E.6 Floating Point (FP)

Error code format: 0000.000X

Table E–8 lists the codes corresponding to X.

Table E–8 Floating Point Error Codes (0000.000X)

Error Codes	Definition.
0002	Floating point error.
0004	Invalid floating point exception.

E.7 Interval timer (IT)

Error code format: 0000.000X

Where X is either a 2 for a fatal error or a 1 for a success.

E.8 SCSI Bus Controller (SCSI-A and SCSI-B)

This section includes the codes for all of the SCSI bus controllers on all systems.

Error code format: WWXX.YYZZ

Where WW is the bit mask field of the devices selected successfully on the SCSI bus. Refer to Table E–9. XX is the bit mask field of the devices that tested successfully. Refer to Table E–9. YY is a set of bitmap error flags. Refer to Table E–10. ZZ is the status/error code of the SCSI bus controller on the system module. Refer to Table E–11.

Second line error code format: DDMMSSTT

Where the DD is the status of the data in phase on the INQUIRY command, MM is the status of the message in phase of the INQUIRY command, SS is the status of the status phase of the INQUIRY command, and TT is the status of the devices on the SCSI bus. All of these status codes are identical. Refer to Table E–12.

The second line of code indicates the status of the eight possible devices on the SCSI bus including the bus controller on the system module. The first code in this second line is reserved for the SCSI bus controller on the system module and the second through eight code is for the devices connected to the SCSI bus.

Table E–9 Binary Mask of Selected Devices (WWXX.0000)

Binary Mask	Device ID	As Seen on the Screen
0000 0001	0	01
0000 0010	1	02
0000 0100	2	04
0000 1000	3	08
0001 0000	4	10
0010 0000	5	20
0100 0000	6	40
1000 0000	7	80

Table E–10 Binary Mask of Error Flags (0000.YY00)

Binary Mask	Definition	As Seen on the Screen
0000 0001	Problem is on the system module.	01
0000 0010	Problem is not on the system module.	02
0001 0000	Reset is required to free SCSI bus.	10
0010 0000	Not all selected devices are operating correctly.	20
0100 0000	DMA and interrupts are untested.	40

Table E–11 SCSI Bus Controller's Error Codes (0000.00ZZ)

Error Codes	Definition
01	No error
02	Data buffer RAM addressing failure.
04	Data buffer RAM byte mask failure.
06	Data buffer data path failure.
10	Error in SCSI bus controller registers during reset.
12	Error in SCSI bus controller registers after reset.
20	Unexpected interrupt after reset, IPL = 1F.
22	No interrupt request after reset.
24	No interrupt after reset when IPL has been lowered.
26	Interrupt request not cleared following ISR (after reset).
28	Multiple interrupts following reset.
2A	Unknown interrupt following reset.
2C	Wrong interrupt following reset.
30	Phase not bus free at start of test.
40	First attempt to read SCSI bus controller's registers failed.
42	SCSI bus controller register address test failed at ini_cmd.
44	SCSI bus controller register address test failed at mode.
46	SCSI bus controller register address test failed at tar_cmd.

Table E–11 (Cont.) SCSI Bus Controller's Error Codes (0000.00ZZ)

Error Codes	Definition
48	SCSI bus controller register address test failed at scd_cnt.
4A	Mode(DMA) found set after being cleared when ini_cmd(bsy) clear.
4C	Mode(DMA) found set after being set when ini_cmd(bsy) clear.
4E	Mode(DMA) found set after being cleared when ini_cmd(bsy) set.
50	Mode(DMA) found clear after being set when ini_cmd(bsy) set.
60	Data output to bus with ini_cmd(enout) clear.
62	No data to bus with ini_cmd(enout) set.
64	Parity bit cur_stat(dbp) did not match data on bus.
66	With bus free, data in did not match data out.
68	ini_cmd(sill) to cur_stat(sel) mismatch.
6A	ini_cmd(ack) to status(ack) or ini_cmd(atn) to status(atn) mismatch.
6C	Tar_cmd(req) to cur_stat(req) or tar_cmd(msg) to cur_stat(msg) or tar_cmd(cd) to cur_stat(cd) or tar_cmd(io) to cur_stat(io) mismatch with mode(targ) set.
6E	Clearing mode(targ) does not prevent tar_cmd bits from appearing on the bus.
70	ISR hit with IPL = 1F and int_msk(sc) clear.
72	Interrupt request int_req(sc) set for no reason.
74	SCSI bus status(intreq) set for no reason.
80	SCSI bus busy at start if interrupt test - no test done.
82	ISR hit following bus free with IPL = 1F and int_msk(sc) clear.
84	Interrupt request int_req(sc) not set following bus free.
86	SCSI bus status(intreq) not set following bus free.
88	Status(bsyerr) not set after it caused an interrupt.
90	SCSI bus busy during interrupt test - no test done.
92	ISR hit following bus free with IPL = 1F and int_msk(sc) set.
94	Interrupt request int_req(sc) not set following bus free.

Table E–11 (Cont.) SCSI Bus Controller's Error Codes (0000.00ZZ)

Error Codes	Definition
96	SCSI bus status(intreq) not set following bus free.
98	Status(bsyerr) not set following bus free.
A0	SCSI bus busy during interrupt test - no test done.
A2	Timeout waiting for bus free interrupt.
A4	ISR not hit following bus free.
A6	Interrupt request int_req(sc) not cleared following ISR after bus free.
A8	SCSI bus status(intreq) not set following bus free.
AA	Multiple interrupts from bus free.
AC	Unknown interrupt from bus free.
AE	Wrong interrupt from bus free.
B0	SCSI bus busy during interrupt test - no test done.
B2	Timeout waiting for parity interrupt.
B4	ISR not hit following parity.
B6	Interrupt request int_req(SC) not cleared following ISR after parity.
B8	SCSI bus status(intreq) not set following parity.
BA	Multiple interrupts from parity.
BC	Unknown interrupt from parity.
BE	Wrong interrupt from parity.
C0	Phase is not bus free before arbitration.
C2	Ini_cmd(aip) bit failed to set.
C4	Lost arbitration (first check of ini_cmd(la)).
C6	Higher priority device in bus.
C8	Lost arbitration (second check of ini_cmd(la)).
D0	Not all selected targets tested satisfactory.

Table E-12 Device Status Codes (DDMMSSTT)

Status Codes	Definition
FF	Device is untested.
01	No error.
03	This device is reserved by the host (SCSI bus controller).
05	Device did not respond to selection.
10	Device did not set cur_stat(req) soon enough when changing phase.
12	Jitter on the phase lines when changing phase.
20	Device set command phase twice.
22	Device changed phase before command complete.
24	Device failed to set cur_stat(req) when getting command.
26	Device failed to clear cur_stat(req) when getting command.
28	Command phase out of sequence.
2A	Stuck in command phase.
30	Device set data in phase twice.
32	Device failed to set cur_stat(req) when returning data.
34	Device failed to clear cur_stat(req) when returning data.
36	Device changed data in phase before transferring any data.
38	Data in phase out of sequence.
3A	Stuck in data in phase.
40	Target set status phase twice.
42	Target failed to set cur_stat(req) when returning data.
44	Target failed to clear cur_stat(req) when returning data.
46	Target changed status phase before transferring any data.
48	Status phase out of sequence.
4A	Stuck in status phase.
50	Target set message in phase twice.
52	Target failed to set cur_stat(req) when returning data.

Table E–12 (Cont.) Device Status Codes (DDMMSSTT)

Status Codes	Definition
54	Target failed to clear cur_stat(req) when returning data.
56	Target changed message_in phase before transferring any data.
58	Message in phase out of sequence.
5A	Stuck in message in phase.
60	Target set data out phase (unexpectedly).
62	Target set phase to 100b (reserved phase).
64	Target set phase to 101b (reserved phase).
66	Target set message out phase.
68	Selected target did not set any phase before releasing bus.
70	Target not following expected phase sequence.
72	Parity error detected during programmed I/O transfer.
80	Unexpected interrupt at start of DMA test.
90	Target failed to set command phase.
92	Unexpected interrupt at start of command phase in DMS test.
94	Timeout waiting for DMA complete in command phase in DMA test.
96	No DMA end following command phase in DMA test.
98	Wrong interrupt following command in DMA test.
9A	Scd_cnt not zero following command in DMA test.
9C	DMA not complete after EOP command phase (ACK not clear soon enough).
A0	Status(dmaend) bit not cleared by clearing mode(DMA) at start of data in phase in DMA test.
A2	Target failed to set data in phase in DMA test.
A4	Timeout waiting for DMA complete in data in phase in DMA test.
A6	No status(dmaend) following data in phase in DMA test.
A8	Wrong interrupt following data in phase in DMA test.
AA	Scd_cnt not zero following data in phase in DMA test.

Table E-12 (Cont.) Device Status Codes (DDMMSSTT)

Status Codes	Definition
AC	DMA not complete after EOP in data in phase (ACK not clear soon enough).
B0	Status(dmaend) not cleared by clearing mode(DMA) at start of status phase in DMA test.
B2	Target failed to set status phase in DMA test.
B4	Timeout waiting for DMA complete in status phase in DMA test.
B6	No status(dmaend) following status phase in DMA test.
B8	Wrong interrupt following status in DMA test.
BA	Scd_cnt not zero following status in DMA test.
BC	DMA not complete after EOP in status phase (ACK not clear soon enough).
C0	Status(dmaend) not cleared by clearing mode(DMA) at start of message in phase in DMA test.
C2	Target failed to set message in phase in DMA test.
C4	Timeout waiting for DMA complete in message in phase in DMA test.
C6	No status(dmaend) following message in phase in DMA test.
C8	Wrong interrupt following message in phase in DMA test.
CA	Scd_cnt not zero following message in phase in DMA test.
CC	DMA not complete after EOP in message in phase (ACK not clear soon enough).
D0	Status(dmaend) not cleared by clearing mode(DMA) at end of DMA test.
D2	SCSI bus not free soon enough at end of DMA test.

E.9 Interrupt Controller and Ethernet ID ROM (SYS)

Error code format: 0000.XXXX

Table E–13 lists the codes corresponding to XXXX.

Table E–13 Interrupt Controller/Ethernet ID ROM Error Codes (0000.XXXX)

Error Codes	Definition
0001	No error.
0002	System ROM failed checksum.
0004	Ethernet ROM failed checksum.
0008	No interrupts pending.
0010	All of the expected interrupts did not occur.
0020	Unexpected interrupt.
0040	Improper priority.
0080	Default interrupt service routine was called. An interrupt that was not enabled occurred.
0100	No keyboard found in the configuration.

E.10 DSH32-B Communications Module Asynchronous Subsystem (DSH32-A)

Error code format: 00XX.YYYZ

Where XX is a bitmap representing the number of the failed line. Table E–14 lists the codes corresponding to YYYZ. If Z=0 then the error is fatal.

Table E–14 DSH32-A Error Codes (0000.YYYZ)

Error Code[1]	Definition
0001	Normal SLU module operation; no errors detected.
0010	Control and status register failed read after write test.
0020	Controller is hung; internal hardware self-test never flagged completion by clearing CSR reset bit.
0030	Internal hardware self-test failed; diagnostic fail bit set.
0040	Internal self-test result bytes failed to generate a receiver interrupt.
0050	Receiver done not set following internal hardware self-test.
0060	Receiver done not clear after reading self-test bytes.
0070	Valid data not found in receiver FIFO.
00A0	Data valid bit was set when FIFO should have been empty.
00B0	Internal self-test error—low octart error.
00C0	Internal self-test error—high octart error.
00D0	Internal self-test error—RAM error.
00E0	Internal self-test error—undefined status code found.
0101	FIFO size register error; FIFO SB empty, size register indicates FIFO is not empty.
2000	An illegal transmitter interrupt was detected.
2020	A data compare error was detected while performing alternating bit pattern read after write test of the SLU RAM space.

[1]Low 16-bits of the module information line or the appropriate 16-bits for a particular communication line.

Table E–15 DSH32-A Field Service Mode Error Codes (0000.YYYZ)

Error Code[1]	Definition
0001	Normal operation; no errors detected.
0050	Receiver done not ready following internal autodiagnostics.
0060	Receiver done not clear after reading self-test bytes.
0070	Valid data not found in receiver FIFO.
0080	Transmitter failed to generate interrupt on transmit FIFO empty.
011x	Transmitter did not become ready before timer expired following null character transmitted.
0120	Data not received; receiver done did not become ready before timer expired following transmission of an ASCII character.
0131	Null character expected in receiver FIFO, not found.
0141	Transmitted data expected in receiver FIFO, not found.
0161	Transmit FIFO overrun error detected during basic data transmission test.
0171	Framing error occurred during basic data transmission test.
0181	Parity error occurred during basic data transmission test.
0190	FIFO data "receive line" bit field indicates that the data was received on the wrong line.
01A0	Transmitter action bit not clear with data sent on disabled line.
01B1	Receiver not done when data is expected from FIFO.
01D1	Port never became ready to send new data.
2010	Transmit ready bit did not clear with transmitter action FIFOs emptied.

[1]Low 16-bits of the module information line or the appropriate 16-bits for a particular communication line.

E.11 DSH32-B Communications Module Synchronous Lines (DSH32-S)

Error code format: XXXX.YYY0

Where XXXX indicates the test number and YYY is the fault code. Table E–16 lists the codes corresponding to XXXX.

NOTE

If a fault code is returning the address of the failing register, this address is only the last three hex digits of the 32-bit address. It should be understood that the prefix "39000" must be added to any address that is returned.

Table E–16 DSH32-S Error Codes (XXXX.YYY0)

Error Codes	Message Description
0001.YYY0	µDMA DAL bus test.
0002.YYY0	Static RAM checkerboard test.
0003.YYY0	Static RAM SNAIR test.
0004.YYY0	I/O register test.
0005.YYY0	DUSCC I loopback connector test.
0007.YYY0	µDMA static (register) test.
0008.YYY0	DUSCC I static (register) test.
000A.YYY0	Reset circuit test.
000B.YYY0	DUSCC I counter/timer test.
000D.YYY0	DUSCC I Modem signal test.
000F.YYY0	DUSCC I BOP protocol transmit/receive test.
0011.YYY0	DUSCC I COP/BISYNC protocol test.
0013.YYY0	DUSCC I dynamic test.
0015.YYY0	µDMA-DUSCC I interrupt test.
0017.YYY0	DUSCC I interrupt test.

E.12 Ethernet Circuits (NI)

Error code format: 0WXX.YYYY

Where W = 1 if no heartbeat present (0 = heartbeat present), XX is the number of retries over the Ethernet cable before a success. Table E–17 lists the codes corresponding to YYYY.

Table E–17 Ethernet Circuits Error Codes (0000.YYYY)

Error Codes	Definition	Error Codes	Definition
0001	No error.	4008	Bad filter value.
1002	Failed initialization.	400A	Initialization failed.
1004	RX not enabled.	400C	Failed loopback.
1006	TX enabled.	400E	Initialization failed.
1008	Initialization failed.	4010	Failed loopback.
100A	RX enabled.	5002	Initialization failed.
100C	TX not enabled.	5004	OWN not toggled.
2002	Initialization failed.	5006	No RTRY error.
2004	Failed loop.	5008	TX turned off.
3002	Initialization failed.	500A	Initialization failed.
3004	Failed loop.	500C	TX failed.
3006	No CRC match.	500E	No RCV MISS.
3008	Initialization failed.	6002	Initialization failed.
300A	Failed TX.	6004	Loopback failed.
300C	Failed RX.	6006	Bad CSR0.
300E	Initialization failed.	6008	No NI interrupt.
3010	Failed TX.	600A	Initialization failed.
3012	OWN not toggled.	600C	Loopback failed.
3014	No RX error.	600E	Wrong number of interrupts.
3016	No STP.	6010	NI interrupts bits set.
3018	No ENP.	7002	Initialization failed.

Table E-17 (Cont.) Ethernet Circuits Error Codes (0000.YYYY)

Error Codes	Definition	Error Codes	Definition
301A	No CRC error.	7004	OWN not toggled.
301C	No FRAM error.	7006	No BUFF error.
301E	No RINT.	7008	TX still on.
4002	Initialization failed.	700A	Initialization failed.
4004	Failed TX.	700C	TX failed.
4006	Packet received.	700E	RX failed.

F

System Exerciser Error Codes

This appendix lists the status and error codes for the system exerciser. When examining the exerciser report, a single question mark (?) indicates a soft error, two question marks (??) indicate a hard error. The absence of question marks indicates success. Table F–1 lists the contents of this appendix by sections.

Table F–1 Failing Test/Device Section References

Failing Test/Device	Section
Test F - Not supported	–
Test C - Serial line controller (DZ)	F.1
Test B - System memory (MEM)	F.2
Tests 6 and 7 - SCSI bus controller (SCSI-A and SCSI-B)	F.3
Test 4 - DSH32-B asynchronous subsystem	F.4
Test 3 - DSH32-B synchronous subsystem	F.5
Test 1 - Ethernet network (NI)	F.6

F.1 Serial Line Controller (DZ)

Error code format: 0LSS.ABCD

Where the 0LSS is the status code and the ABCD is the error code.

The letters L, SS, A, B, C, and D indicate the following:

Table F-2 Status Code Format Significance

Letter	Significance
L	The serial line used by the console.
SS	Whether the error code portion (.ABCD) is indicating a device hard error (FF), a system software error (0F), or the status of the four serial lines (00).
ABCD	Either a device hard error (all four digits), a system software error (all four digits), or the serial line status (one digit for each of the four serial lines).

When SS is 00, each letter in the ABCD code represents a status/error for each serial line. Table F-3 gives the letter to serial line assignments.

Table F-3 Serial Line Assignments (0000.ABCD)

Letter	Serial Line
A	MMJ Port 1
B	MMJ Port 2
C	Modem
D	MMJ Port 3

The following tables explain all error and status codes used:

- Table F-4 lists codes used to indicate the console (L).
- Table F-5 lists the serial line status codes for each of the four serial lines (ABCD) when SS is 00.
- Table F-6 lists the device hard error (ABCD) when SS is FF.

When SS is 0F, system software error, the error codes in ABCD range from 0001 to 000B and are considered fatal.

Table F-4 Serial Line Console Codes (0L00.0000)

Code	Serial Line
0	MMJ Port 1
1	MMJ Port 2
2	Modem
3	MMJ Port 3

Table F-5 Each Serial Line's Status/Error Codes (0000.ABCD)

Error Codes	Definition
0	No error is detected for this line.
1	No character is received.
2	Failed to transmit all characters or transfer took too long or lost receive characters.
3	Too many characters received.
4	Character received not equal expected.
5	Parity, framing, or overrun error detected.
6	Baud rate timing error.
7	Modem signals not equal expected.
8	Overrun error not equal 0.
9	Character received not equal expected.
A	Overrun error failed to set.
B	Framing error failed to set.
C	TxRdy bit failed to set.
D	Transmit line received not equal expected.
E	Interrupt request bit ST not set in INT_REQ register.
F	Interrupt request bit ST not cleared in INT_REQ register.

Table F–6 Fatal Device's Error Codes (00FF.ABCD)

Error Codes	Definition
0001	Interrupt mask register, INT_MSK, register bits ST or SR stuck at 1.
0002	Master clear failed to reset DZQ.
0003	CSR register: expected %x1028.
0004	CSR register failed to clear.
0005	TCR register: expected %x0F0F
0006	TCR register failed to clear.
0007	TRDY bit in CSR stuck at 1.
0008	TRDY bit in CSR failed to set.
0009	TRDY bit in CSR failed to clear after transmitting a character.
000A	TRDY bit in CSR failed to set after transmitting a character.
000B	RDONE bit failed to set after transmitting character in internal loopback mode.
000C	SR bit in INT_REQ register not set by RDONE.
000D	SR bit in INT_REG register not cleared by writing bit in INT_CLR register.
000E	Character received: 0 or line number not equal expected.
000F	Data valid bit not set in word read.
0010	Silo alarm enable failed to set in CSR.
0011	Silo alarm failed to set after transmitting 16 characters in internal loopback.
0012	RDONE not set after 16 characters received.
0013	SR bit in INT_REQ register not set by silo alarm.
0014	Silo alarm failed to clear after reading a character from silo.
0015	Master clear failed to reset the DZQ.
0016	Unexpected transmit interrupt occurred with interrupt mask bit cleared.

Table F-6 (Cont.) Fatal Device's Error Codes (00FF.ABCD)

Error Codes	Definition
0017	Unexpected receive interrupt occurred with interrupt mask bit cleared.
0018	INT_MSK register bit ST failed to set.
0019	Failed to receive a transmit interrupt.
001A	Transmit interrupt occurred with INT_MSK bit ST cleared.
001B	INT_MSK register bit SR failed to set.
001C	Failed to receive a receive interrupt.
001D	Receive interrupt occurred with INT_MSK bit SR cleared.
001E	TRDY failed to set after setting line enable for line in TCR register.
001F	TRDY failed to set in allotted time.

F.2 System Memory (MEM)

Error code format: XXXX.00YZ

Where XXXX indicates the status code and Y and Z indicate the type of error. Table F-7 lists the codes.

When there is no error, the status code (XXXX.0001) indicates the number of pages tested at the time of the report. Otherwise, the status code indicates the failing test.

Table F-7 System Memory Error Codes (XXXX.00YZ)

Error Codes	Definition
0000.0001	Success—No error.
0001.000F	System software error.
0002.000F	System software error.
0003.000F	System software error.

Table F–7 (Cont.) System Memory Error Codes (XXXX.00YZ)

Error Codes	Definition
0004.000F	System software error.
0005.000F	System software error.
0006.000F	System software error.
0007.000F	System software error.
0008.000F	System software error.
0001.001F	Compare error on system module.
0002.001F	Compare error on option module.
0001.002F	Parity error on system module.
0002.002F	Parity error on option module.

F.3 SCSI Bus Controller (SCSI-A and SCSI-B)

This section includes the codes for all of the SCSI bus controllers on both systems.

Bus controller code format: TUVV.XYZ1

The letters T, U, VV, X, Y, and Z indicates the following:

Table F–8 Bus Controller Code Format Significance

Letter	Significance
T	SCSI address ID of the SCSI bus controller (should be a 6).
U	Results of the transfer test.
VV	The error count (in hexadecimal) during the transfer test.
X	Results of the interrupt test.
Y	Results of the register test.
Z	Results of the buffer test.

Drive error code format: JKLL.PRS1

The letters J, K, LL, P, R, and S indicate the following:

Table F–9 Drive Code Format Significance

Letter	Significance
J	The SCSI ID of the drive (1 through 7).
K	Whether the drive is removable (1) or writable (2) or removable and writable (3).
LL	The error count (in hexadecimal) for the drive.
P	The last command on the SCSI bus.
R	The status of the drive.
S	The results of the routine test on the drive.

The following tables explain all error and status codes used:

- Table F–10 lists the error codes for the U, X, Y, and Z bit positions.
- Table F–11 lists the last command codes (P).
- Table F–12 lists the codes for drive status (R).
- Table F–10 lists the error codes for the routine status (S).

Table F–10 SCSI Bus Controller Error Codes (0U00.XYZ1) (0000.00S1)

Error Code	Definition
0	Success—No error.
1	Controller error:
	DMA bit will not set in TPC controller MODE register.
	Target command register is not valid.
	Initiator command register is not valid.
	Bus free is not valid.
	Phase Match bit in bus and status register is not valid.
	Interrupt Request bit in bus and status register is not valid.
2	Data path error:

Table F–10 (Cont.) SCSI Bus Controller Error Codes (0U00.XYZ1) (0000.00S1)

Error Code	Definition
	Data path in longword, word, or byte access failed.
	Unable to access all of data buffer.
	Unable to reach TPC controller, and unable to write to mode register.
3	DMA count error:
	Count register is not verified.
	Count is not 0 after DMA transfer.
4	Timeout error:
	No phase match within timeout period.
5	Interrupt error:
	Interrupt is not received when expected.
	An error occurred while testing the system interrupt logic.
6	Unexpected interrupt error:
	Unexpected interrupt received.
7	Command error:
	Request SENCE command ended without sence data.
	Command terminated with bad device status.
8	Phase error:
	Unexpected phase, or phase change on the SCSI bus.
9	Buffer overflow error:
	Too many bytes read from target.
A	Arbitration error:
	AIP bit in initiator command register not set during arbitration process, or arbitration lost during arbitration process, or arbitration not won.
B	Target will not set BSY during selection process, the controller is busy at start of register test, or the INI_CMD(BSY) bit did not toggle during the register test.

Table F-10 (Cont.) SCSI Bus Controller Error Codes (0U00.XYZ1) (0000.00S1)

Error Code	Definition
C	Unable to loop data out onto SCSI bus and back in again.
D	Direction and phase of SCSI bus as set by the target and read from the controller are incompatible.
E	SCSI bus does not drop REQ within timeout period or SCSI bus does not assert REQ within timeout period.
F	DMAEnd bit not verified in bus and status register or DMA data not matching expected data.

Table F-11 Last Command on the SCSI Bus Codes (0000.P001)

Bus Code	Last Command
0	Com$unitready
1	Com$requestsence
2	Com$inquiry
3	Com$senddiagnostics
4	Com$recdiagnostics
5	Com$read
6	Com$write
7	Com$rewind
8	Com$filemark
9	Com$mode_sense

Table F-12 Drive Status Codes (0000.0R01)

Status Code	Definition
0	Ready - Drive is on-line and ready for commands.
2	Off-line - Status given to devices that will not respond to selection process or status given to all devices for initialization.

Table F–12 (Cont.) Drive Status Codes (0000.0R01)

Status Code	Definition
4	Not ready - Status given to devices that are selectable, but return a not ready status during status phase of a command (command tried five times).
6	Diagnostic error - Device returned an error status after a self-test.
8	Key error - Unable to rewrite Field Service key on removable media sequential device.

F.4 DSH32-B Asynchronous Subsystem (DSH32-A)

Status code and error code format: 00XX.YYYY

Line status code format: YYYY

where XX is a bitmap indicating which lines have failed and YYYY is the error code for that line.

The line status code format, YYYY, is repeated for each of the eight asynchronous lines.

Table F–13 Exerciser Error Codes for the DSH32-A Subsystem

Error Code[1]	Definition
0000	Fatal software error occurred making a call to ELN KERNEL.
0001	Normal SLU module operation; no errors detected (00FF.0001).
0010	Control and status register failed read after write test.
0020	Controller is hung, internal hardware self-test never flagged completion by clearing CSR reset bit.
0030	Internal hardware self-test failed, diagnostic fail bit set.
0050	Receiver done not set following internal auto diagnostics.
0070	Could not find any valid data in receiver FIFO.
00B0	Internal self-test error—Low octart error.
00C0	Internal self-test error—High octart error.

[1]Low 16 bits of the module information line or the appropriate 16-bits for a particular communication line.

Table F-13 (Cont.) Exerciser Error Codes for the DSH32-A Subsystem

Error Code[1]	Definition
00D0	Internal self-test error—RAM error.
00E0	Internal self-test error—Undefined status code found.
010Y	FIFO size register error; FIFO SB empty but size register indicates FIFO is not.
011Y	Transmitter did not become ready before timer expired following ASCII character transmitted; nonfatal error.
0110	Transmitter did not become ready before timer expired following ASCII character transmitted; fatal error.
012Y	Receiver done did not become ready before timer expired following ASCII character transmitted.
019Y	FIFO data "received line" bit field indicates that the data was received on the wrong port during simultaneous channel data transmission test.
020Y	Transmit FIFO overrun error detected during simultaneous channel data transmission test.
021Y	Framing error occurred during simultaneous channel data transmission test.
022Y	Parity error occurred during simultaneous channel data transmission test.
023Y	Data error on port; channel 0 dropped from test.
024Y	Data error on port; channel 1 dropped from test.
025Y	Data error on port; channel 2 dropped from test.
026Y	Data error on port; channel 3 dropped from test.
027Y	Data error on port; channel 4 dropped from test.
028Y	Data error on port; channel 5 dropped from test.
029Y	Data error on port; channel 6 dropped from test.
02AY	Data error on port; channel 7 dropped from test.
02B0	All lines have been dropped—Data wrap tests can no longer run.

[1]Low 16 bits of the module information line or the appropriate 16-bits for a particular communication line.

Table F–13 (Cont.) Exerciser Error Codes for the DSH32-A Subsystem

Error Code[1]	Definition
02C0	Receive FIFO contained more than eight internal self-test result bytes.
02DY	Parity error detected during multiport data wrap test.
02EY	Framing error detected during multiport data wrap test.
02FY	Overrun error detected during multiport data wrap test.
0300	Time-out occurred waiting for transmitter interrupt service routine to flag completion of data packet transmission.
0310	Time-out occurred waiting for receiver interrupts.
032Y	Data lost on line.
0330	Receiver done did not clear after emptying receive FIFO.
0340	Data error detected while testing RCVR FIFO.
0350	Status error found while testing RCVR FIFO.
0360	Ran out of usable ports in testing RCVR FIFO; all lines failed.
0370	256 character packet not completely received during FIFO test.
0380	Data valid not clear after emptying receive FIFO.
0390	Failed to force overrun error in receive FIFO test.
0400	Controller is hung, internal hardware skip self-test did not flag completion by setting receiver done bit.
0420	Entire data packet lost during simultaneous transmission test.
043Y	Transmit FIFO did not have enough space to transmit entire data packet during receive FIFO test.
0440	SLU requested an interrupt for an unused line; interrupt requests should come from lines 0 through 7 only.
045Y	Data packet only partially received from FIFO when timer for receive data expired.
0460	Data was received on an unused line. Data should come from lines 0 through 7 only.
1000	The base system firmware returned a fatal status condition when the exerciser requested a communication port with the system exerciser monitor.

[1]Low 16 bits of the module information line or the appropriate 16-bits for a particular communication line.

Table F-13 (Cont.) Exerciser Error Codes for the DSH32-A Subsystem

Error Code[1]	Definition
1010	Found background monitor error code (307 octal) during receive FIFO test.
1020	Found background monitor error code (307 octal) during simultaneous channel transmission test.
1030	A read of the CSR register was returned as all 1s. May indicate that the controller board is not firmly plugged into the MicroVAX 2000 system module.
1040	A read of the RBUF register was returned as all 1s. May indicate that the controller board is not firmly plugged into the MicroVAX 3100 or VAXserver 3100 system module.

[1]Low 16 bits of the module information line or the appropriate 16-bits for a particular communication line.

F.5 DSH32-B Synchronous Subsystem (DSH32-S)

The error code format for both lines of the display is as follows: XXXX.YYYY

Where XXXX is the status code and YYYY is the error code.

Table F-14 Exerciser Error Codes for DSH32-S Subsystem

Status Code	Error Code	Diagnostic Message Description
00XX	YYYY	Basic system module running okay (top line displayed).
0001	0000	1 line (port 0) running, no lines failed
0011	0000	2 lines (port 0 and port 1) running, no lines failed.
0000	0001	No lines running, 1 line (port 0) failed.
0000	0011	No lines running, 2 lines (port 0 and port 1) failed.
0001	0010	1 line (port 0) running, 1 line (port 1) failed.
0010	0001	1 line (port 1) running, 1 line (port 0) failed.
0000	0001	Successful running of an individual port line (2nd and/or 3rd lines displayed).

Table F–14 (Cont.) Exerciser Error Codes for DSH32-S Subsystem

Status Code	Error Code	Diagnostic Message Description
1XXX	YYYY	Module system errors.
1000	0001	Unable to communicate with VSE monitor.
1100	YYYY	Unable to attach ISR to device reason masks.
1100	7C1C	Bad mode—The procedure was called from a program that was not running in kernal mode.
1100	7C3C	Bad value—The device_variable argument is an array with more than 16 elements.
1100	7C74	Device already connected—The device named in the ker$create_device call is already connected to a DEVICE value.
1100	7C9C	No access—An argument specified is not accessed to the calling program
1100	7CF0	No object—No free job object table entries available.
1100	7CE4	No pool—No free system pool is available.
1100	7CFC	No such device—The device name specified in a Ker$create_device. Call cannot be found in the list of devices.
1100	7D24	No system pages—No free system page table entries are available to map the I/O region.
1200	YYYY	Unable to map interrupt registers to physical memory mask.
1200	7C1C	Bad mode—The physical address argument was specified by a program that was not running in kernal mode.
1200	7C3C	Bad value—The virtual_address argument is not the job's address space.
1200	7C9C	No access—An argument specified is not accessible to the calling program.
1200	7CB4	No memory—No free pages of physical memory are available.
1200	7D04	No virtual—No free contiguous virtual address space is available for process.

Table F-14 (Cont.) Exerciser Error Codes for DSH32-S Subsystem

Status Code	Error Code	Diagnostic Message Description
1300	YYYY	Unable to map tx/rx buffers to physical memory mask.
1300	7C1C	Bad mode—The physical address argument was specified by a program that was not running in kernal mode.
1300	7C3C	Bad value—The virtual_address argument is not in the job's address space.
1300	7C9C	No access—An argument specified is not accessible to the calling program.
1300	7CB4	No memory—No free pages of physical memory are available.
1300	7D04	No virtual—No free contiguous virtual address space is available for the process.
1400	YYYY	Unable to free mapped tx/rx buffers to physical memory mask.
1400	7C3C	Bad value—The virtual_address argument is not in the job's address space.
1500	YYYY	Unable to allocate device type memory.
1500	7C1C	Bad mode—The physical address argument was specified by a program that was not running in kernal mode.
1500	7C3C	Bad value—The virtual_address argument is not in the job's address space.
1500	7C9C	No access—An argument specified is not accessible to the calling program.
1500	7CB4	No memory—No free pages of physical memory are available.
1500	7D04	No virtual—No free contiguous virtual address space is available for the process.
2XXX	YYYY	Interrupt service routine (Individual port errors).
2001	0001	(System error) illegal port 1 interrupt.

Table F–14 (Cont.) Exerciser Error Codes for DSH32-S Subsystem

Status Code	Error Code	Diagnostic Message Description
2002	YYYY	DUSCC I RSRA error bit set YYYY = input register value.
2003	YYYY	DUSCC I transmit error bit set YYYY = input register value.
2004	YYYY	UDMA transmit current byte count error port 0 YYYY = input register value.
2005	YYYY	UDMA receive current byte count error port 0 YYYY = input register value.
2200	YYYY	(System error) illegal port number detected in ISR YYYY = port number which will be more than 2.
3XXX	YYYY	Loopback connector error (individual port errors).
3000	YYYY	Port 0 loopback connector mask.
3000	000F	No cable.
3000	000E	V.35 cable (not used).
3000	000D	RS-423/V.24 cable.
3000	000C	X.21 cable (not used).
3000	000B	V.36/RS-422
3000	0000	Loopback cable.
4xxx	YYYY	Individual port errors during burst test.
4000	7C54	Time-out occurred waiting for the device to see bit indicating operation complete during functional mode test (port 0).
411X	YYYY	(System error) kernal error while testing port 0 (X = test mode: 1 = Customer, 2 = Field Service, 3 = manufacturing).
411X	7C04	Bad count—The procedure call specified an incorrect number of arguments.
411X	7C34	Bad type—An argument in the object list is not a type that can be waited for.

Table F-14 (Cont.) Exerciser Error Codes for DSH32-S Subsystem

Status Code	Error Code	Diagnostic Message Description
411X	7C3C	Bad value—An argument in the object list is invalid or refers to a deleted object.
411X	7C9C	No access—An argument specified is not accessible to the calling program.
412X	7C54	Time-out occurred waiting for the device to set DONE bit indicating operation complete during burst test of port 0 (X = test mode: 1 = customer, 2 = Field Service, 3 = manufacturing).
413X	YYYY	(System error) kernal error while testing port 0 (X = test mode: 1 = customer, 2 = Field Service, 3 = manufacturing).
413X	7C04	Bad count—The procedure call specified an incorrect number of arguments.
413X	7C34	Bad type—An argument in the object list is not a type that can be waited for.
413X	7C3C	Bad value—An argument in the object list is invalid or refers to a deleted object.
413X	7C9C	No access—An argument specified is not accessible to the calling program.
414X	7C54	Time-out occurred waiting for device to set DONE bit indicating operation complete during burst test for port 0 (X = test mode: 1 = customer, 2 = Field Service, 3 = manufacturing).
41A0	YYYY	(System error) kernal to wait any returned unsuccessfully.
41A0	7C04	Bad count—The procedure call specified an incorrect number of arguments.
41A0	7C34	Bad type—An argument in the object list is not a type that can be waited for.
41A0	7C3C	Bad value—An argument in the object list is invalid or refers to a deleted object.

Table F-14 (Cont.) Exerciser Error Codes for DSH32-S Subsystem

Status Code	Error Code	Diagnostic Message Description
41A0	7C9C	No access—An argument specified is not accessible to the calling program.
5XXX	YYYY	Individual port memory errors.
50XX	YYYY	Unable to initialize port 0 tx buffer memory with a 0 at address 3900.YYYY with XX + 1 memory errors encountered.
52XX	YYYY	Unable to write pattern byte to port 0 tx buffer memory at address 3900.YYYY with XX + 1 memory errors encountered.
54XX	YYYY	Unable to initialize port 0 rx buffer memory with a 0 at address 3900.YYYY with XX + 1 memory errors encountered.
56XX	YYYY	Comparison of transmit and receive buffer for port 0 did not match at address 3900.YYYY with XX + 1 differences found.
6XXX	YYYY	SYNC RAM longword test errors.
6000	YYYY	Unable to allocate memory 32 Kbytes of SYNC RAM space.
6100	YYYY	Unable to free 32 Kbytes of allocated SYNC RAM space.
6200	YYYY	SYNC memory longword compare error detected at address equal to 3900.8000 + offset YYYY.

F.6 Ethernet Network (NI)

Error code format: 000X.ZZZZ

Where X indicates the test number and ZZZZ indicates the error code. Table F-15 lists the test numbers and the type of tests done. Table F-16 lists the error codes that can occur on any test.

Table F–15 Ethernet Test Numbers (000X.0000)

Test Numbers	Definition
1	Initialization and check for interrupt.
2	Internal loopback (with interrupt).
3	Check that the computed CRC is accepted and the incorrect CRC is rejected.
4	Multicast addressing and promiscuous receive.
5, 6	Force collision, miss errors.
7	External loopback (with interrupt).

Table F–16 Ethernet Error Codes (000X.ZZZZ)

Error Code	Definition
0001	Success—No error.
0002	No_packet_received.
0004	Packet_miscompare.
0006	Wrong_received_crc.
0008	Initialization_failed.
000A	Received_packet_with_bad_crc.
000C	Crc_flag_not_set_when_forced.
000E	Received_illegal_multicast.
0010	Rejected_packet_in_prom_mode.
0012	Rejected_legal_multicast.
0014	Rtry_not_set_when_forced.
0016	Buff_not_set_when_forced.
0018	Miss_not_set_when_forced.
001A	Transmit_error.
001C	Transmit_timeout.

G
Diagnostic LED Definitions

This appendix defines the significance of the eight LEDs on the back of the system box during each phase of the testing and power-up initialization.The LEDs are divided into two fields. The first four LEDs indicate the current state of the system and the second set of four depend on the previous four.

There are 16 possible combinations for each set of LEDs. The first four LEDs indicate a particular state of the diagnostics, the second four LEDs indicate a substate. Refer to Table G–1. The number 1 indicates that the LED is lit.

Table G–1 Diagnostic LEDs Definitions

State	Substate	Definitions	Recommendations
1111	1111	Power is applied but no instruction is executed.	See Section G.1.
1111	0000	Power is applied. The ROM code is successfully started and several instructions have been executed.	See Section G.1.
1110	0000	Console memory sizing routine is entered. Memory to hold the console data structures located. The substate variables have no meaning in this section of the test.	See Section G.1.
1101	0000	The console data structures are initialized and have started testing the NVR.	See Section G.1.

Table G–1 (Cont.) Diagnostic LEDs Definitions

State	Substate	Definitions	Recommendations
1100	0000	The NVR test is completed and the DZ test started.	See Section G.1.
1011	0001	The DZ test is completed.	See Section G.1.
1010	0000	The console initialization sequence is entered.	See Section G.1.
1001	xxxx[1]	The system initializes and power-up tests are executed.	If the substate contains any lit LEDs, determine the failing device. If you have a working terminal, troubleshoot that device. See Section G.1 if the terminal screen is blank.
1000	xxxx[1]	The self-test completes with the substate indicating the failing subsystem.	Enter TEST 50 to see the results.
0111	xxxx[1]	Self-test was entered from the console TEST command. The substate indicates the test currently being executed.	Enter TEST 50 to see the results.
0110	xxxx[1]	The self-test completes from the test command with the substate indicating the failing subsystem.	Enter TEST 50 to see the results.
0101	xxxx[1]	The self-test started under control of the APT system. The substate indicates the test currently being executed.	Enter TEST 50 to see the results.

[1] 1111=Not used, 1110=CLK, 1101=NVR, 1100=DZ, 1011=MEM, 1010=MM, 1001=FP, 1000=IT, 0111=SCSI-A, 0110=SCSI-B, 0101=SYS, 0100=DSH32-A, 0011=DSH32-S, 0001=NI

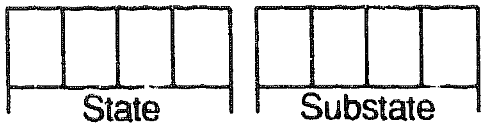
Table G–1 (Cont.) Diagnostic LEDs Definitions

State	Substate	Definitions	Recommendations
0100	xxxx[1]	The system exerciser started from a console TEST command. The substate indicate the value of the lower four bits of the command. If the system exerciser starts with a T 101, the substate contains a 1 (hexadecimal).	Read the test results on the screen.Troubleshoot the failing device.
0011	0000	The system exerciser started under the control of the APT test delivery system.	Read the results on the screen. Troubleshoot the failing device.
0010	xxxx[1]	The entity-based module received a request from a host to enter monitor mode. This lets the host send commands to the system. This is indicated if the functionality of the EBM is implemented at a later release of the system ROM.	Reserved for future use.
0001	xxxx[1]	Console mode was successfully entered and is ready to accept commands. This does not apply to power on. The substate indicates the failing subsystem if there is one. This differs from a self-test complete, because the console can be entered from other means.	This code indicates that the console was entered from something other than a TEST command or power on halt, such as the HALT button.
0000	xxxx	Attempting to boot the system. Once control passes to VMB, the state LEDs have no meaning.	System is booting.

[1] 1111=Not used, 1110=CLK, 1101=NVR, 1100=DZ, 1011=MEM, 1010=MM, 1001=FP, 1000=IT, 0111=SCSI-A, 0110=SCSI-B, 0101=SYS, 0100=DSH32-A, 0011=DSH32-S, 0001=NI

Figure G–1 shows the layout of the LEDs on the back of the system box.

Figure G–1 LED Layout



G.1 Additional LED Information

When the system does not power up successfully or if the diagnostics find an error, the eight LEDs on the back of the system box usually indicate the failing device (the system takes 2 to 5 minutes to complete power-up initialization and testing). However, if the four state LEDs indicate 1111 (F in hexadecimal) through 1010 (A in hexadecimal), the substate LEDs offer no help in determining the failing FRU. You must disconnect an FRU as described in each step in the following procedure until the system does power up normally. Once the system does power-up normally, the last FRU you disconnected is the failing FRU. Replace the failing FRU and reset the system for any further problems.

1. Power down the system, remove drive mounting panel(s) from the system, and remove the DSH32-B communications module (if installed) from the system module. If the DSH32-B communications module is not installed, proceed to step 3.
2. Power up the system with the DSH32-B communications module disconnected. If the system still does not power up correctly, the problem is not in the DSH32-B communications module, proceed to step 3. If the system does power up successfully, replace the DSH32-B communications module and retest the system.
3. Power down the system, remove the memory module from the system module.
4. Power up the system with the memory module disconnected. If the system does not power up correctly, the problem is not the memory module, proceed to step 5. If the system does power up successfully, replace the memory module and retest the system.
5. Power down the system, replace the system module and power up the system again. If the system still does not power up correctly after replacing the system module, replace the power supply.

H
Recommended Spares List

This appendix provides the recommended spares listing for the following:

• MicroVAX 3100, VAXserver 3100	Table H-1
• InfoServer 100	Table H-2
• DSH32 Communications Subsystem	Table H-3
• RZ55-Fx Disk Expansion Box	Table H-4
• TK50Z-Gx Tape Expansion Box	Table H-5
• SZ12x-xx Storage Expansion Box	Table H-6
• RRD40-Fx Compact Disk Expansion Box	Table H-7
• Miscellaneous Parts	Table H-8

Table H–1 MicroVAX 3100 and VAXserver 3100 FRUs

Part Number	Description	Quantity
54-18856-01	MicroVAX 3100 system module (KA41-AA)	1
54-18856-02	VAXserver 3100 system module (KA41-BA)	1
54-18856-04	MicroVAX 3100 system module (KA41-DA)	1
54-18856-05	VAXserver 3100 system module (KA41-EA)	1
54-18858-01	Distribution board	1
54-19051-AA	4MB Memory Module (MS42-AB)	1
54-19850-AA	8MB Memory Module (MS42-KA)	1
54-18287-BA	12MB Memory Module (MS42-BA)	1
54-18324-AA	16MB Memory Module (MS42-CA)	1

Table H–1 (Cont.) MicroVAX 3100 and VAXserver 3100 FRUs

Part Number	Description	Quantity
RZ23-EG	RZ23 104MB SCSI disk drive assembly	1
29-27240-01	RZ23 module/frame assembly	1
29-28144-01	RZ24 drive logic module PCB	1
29-28145-01	RZ24 head/disk assembly (HDA)	1
TZ30-AX	TZ30 95MB tape drive	1
12-19245-00	5 Vdc battery pack	1
RX23-A	1.4MB diskette drive	1
54-19288-01	RX23 FDI module	1
17-02221-02	RX23 FDI ribbon cable	1
H7821-00	AC power supply (Model 10e)	1
H7822-00	AC power supply (Model 20e)	1
17-02294-01	Cable from DSH32-B module to Distribution board	1
17-02295-01	Cable from system module to Distribution board	1
17-02296-01	SCSI-A cable	1
17-02297-01	SCSI-B cable	1
17-02299-01	Power cable for upper drive mounting panel devices	1
54-18324-AA	Power cable for lower drive mounting panel devices	1
17-02566-01	DC power harness (model 10e system only)	1
17-02219-01	DC power harness (for devices on upper drive mounting panel - model 20e system only)	1
17-02464-01	DC power harness (for devices on lower drive mounting panel - model 20e system only)	1
17-00606-02	BN19P-1K system AC power cord (USA)	1
17-01351-01	50-pin to 50-pin SCSI cable	1
17-01351-04	50-pin SCSI cable (18 inches)	1
12-30552-01	50-pin SCSI terminator	1

Table H–2 InfoServer 100 FRUs

Part Number	Description	Quantity
70-28103-01	InfoServer 100 system module (KA41-CA)	1
H7822	Power Supply (Models SEABB/BC-AX and -BX)	1
H7083-BA	Power Supply (Models SEABB/BC-CX and later)	1
12-19245-00	5 Vdc battery pack	1
17-02219-01	Wire harness assy (disk power cable)	1
17-02297-01	Cable assy 50 cond round (SCSI B cable)	1
17-03209-01	Cable assy 50 cond round (SCSI B for SEABB /BC-CX and later)	1
12-33816-01	Terminator single-ended SCSI (internal)	1
17-02909-01	Cable assy 50-cond flat (SCSI A/B dist)	1
RRD40-AA	RRD40 CD Drive assy (factory integrated)	1
RZ23-EG	Embeded RZ23 104MB SCSI disk drive assembly	1
RZ23L-EG	Embeded RZ23L 121MB SCSI disk drive assembly	1
RRD42-AA	Embeded RRD42 CD Drive assy (Models SEABB/BC-BX, -CX and later)	1

Table H-3 DSH32 Communications Subsystem FRUs

Part Number	Description	Quantity
54-18905-01	DSH32-B communications controller[1]	1
54-17230-01	DSH32-Yx driver[1]/receiver module (2nd sync)	1
30-28253-01	H3104 36-pin to 8 6-pin cable concentrator assembly	1
17-01174-02	Cable assembly, 36-cond (for DSH32-B)	1
17-02298-01	Ribbon cable (from DSH32-B to 2nd sync driver/ receiver module)	1
17-02294-01	Ribbon cable (from DSH32-B module to distribution module)	1
17-01871-01	BC19U-02 external 50-pin cable for RS422	1
17-01872-01	BC19V-02 external 50-pin cable for RS232	1
17-01873-01	BC19W-02 external 50-pin cable for RS423	1

[1]The DSH32-B and DSH32-Yx combined is the same as the DSH32-Ex version of the communication module.

Table H-4 RZ55-Fx Disk Expansion Box FRUs (BA40B-AA)

Part Number	Description	Quantity
54-19325-01	SCSI ID switch module	1
54-17163-01	Resistor load module	1
17-02299-01	SCSI ID switch cable	1
17-01249-01	Internal 50-pin data cable	1
17-00342-01	Internal power supply extension cable	1
17-01351-04	External 50-pin cable (1.5 feet)	1
17-00606-10	Power cord 120 Vac (USA)	1
H7848-BA	Power supply (120 Vac)	1
H7848-BB	Power supply (240 Vac)	1
RZ55-E	RZ55 332 MB disk drive assembly	1
29-27347-01	RZ55 logic module PCB	1

Table H–5 TK50Z-Gx Tape Expansion Box FRUs (BA40B-AA)

Part Number	Description	Quantity
54-19325-01	SCSI ID switch module	1
54-17639-01	TK50 controller module (TZK50-AA)	1
54-17163-01	Resistor load module	1
17-02299-01	SCSI ID switch cable	1
17-01397-01	Internal load module extension cable	1
17-01351-04	External 50-pin cable (1.5 feet)	1
17-01249-01	Internal 50-pin data cable (TZK50 to external connector)	1
17-01249-01	Internal 50-pin data cable	1
17 00606-10	Power cord 120 Vac (USA)	1
H7848-BA	Power supply (120 Vac)	1
H7848-BB	Power supply (240 Vac)	1
TK50-AX	TK50 95MB tape drive assembly	1

Table H–6 SZ12x-xx Storage Expansion Box FRUs

Part Number	Description	Quantity
17-00365-19	Cable assembly, 3-conductor IEC-IEC jumper	1
17-00606-10	Power cord 120 Vac (USA)	1
17-02443-01	Cable assembly, 68-posn to 50-posn RT.	1
17-02444-01	Cable assembly, 50-conductor, flat	1
17-02445-01	Cable assembly, 10-conductor, flat	1
17-12446-02	Cable assembly, 50-conductor, mold.	1
17-02447-01	Cable assembly, round, power harness	1
54-19325-02	ID select switch module	1
H7821-00	AC power supply	1

Table H-7 RRD40-Fx Compact Disk Expansion Box FRUs

Part Number	Description	Quantity
17-01351-04	External 50-pin cable (1.5 feet)	1
17-02008-01	External 38-pin cable	1
RRD40-DA	RRD40 600MB compact disk drive assembly	1

Table H-8 Miscellaneous Parts

Part Number	Description	Quantity
30-23507-03	RRD40 test disk	1
12-15336-08	Asynchronous loopback 25-pin (modem port, FS mode)	2
12-25146-01	H3101 36-pin asynchronous loopback	1
12-25083-01	H3103 MMJ "spoon-type" loopback 6-pin	2
12-26259-01	H3198 37-pin RS422 loopback	1
12-25852-01	H3199 50-posn loopback, synchronous	1
12-32442-01	H8575-A 25-pin to D-sub ESD passive adapter	1
12-25869-01	ThinWire Ethernet T-connector	4
12-26318-01	ThinWire Ethernet cable 50-ohm terminator	2
12-22196-01	Standard Ethernet loopback	2
12-30552-01	SCSI 50-pin terminator	2
17-01351-01	50-pin to 50-pin SCSI Cable	1
17-01351-04	50-pin SCSI cable (18 inches)	1
RX23K-10	RX23 diskettes (pkg 10)	1
H3248	25-pin asynchronous RS232 loopback	1

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